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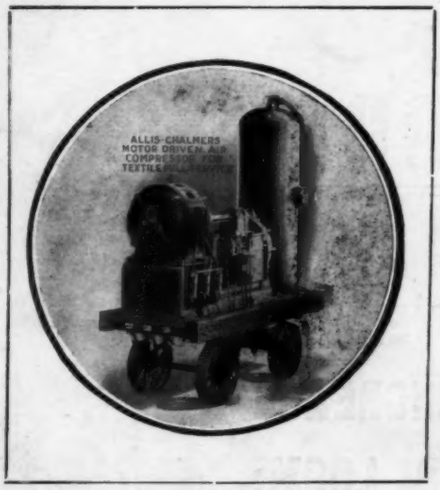

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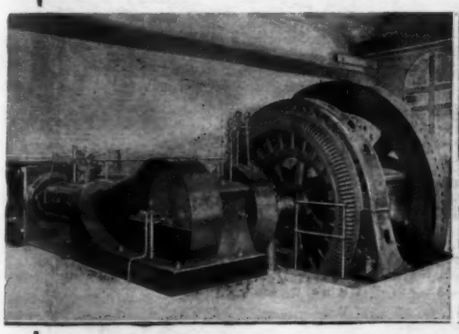

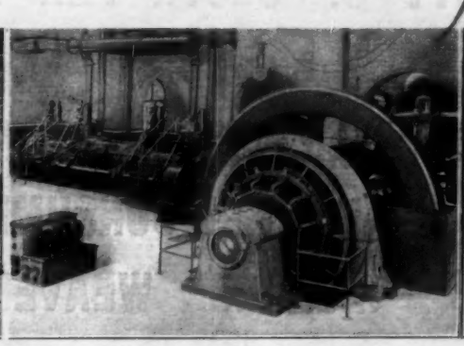

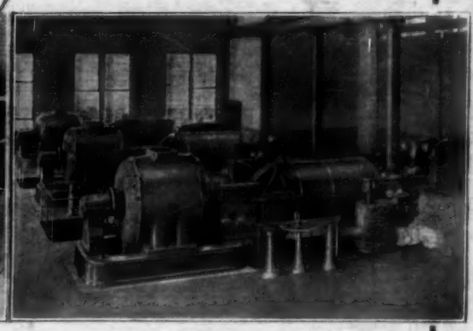

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GOLD DEPRECIATION AND HIGH PRICES.

The world's production of gold during the last fourteen years has been over half as much as the total production for the preceding four hundred years. This continued increase in the supply is not only rapidly decreasing the purchasing value of gold, but is also causing the present far-reaching economic changes in all countries subject to the so-called "gold standard" of value.

As the value of gold does not nominally change, the average person is very apt to fall into the error of assuming that gold disobeys the economic law of supply and demand by remaining constant in price; but by comparing gold with the products of human labor, which are measured by the gold standard, it will be found that the purchasing power of gold has greatly decreased. Corn, which, in 1896 was worth 21.5 cents per bushel at the farm, advanced to 35.7 cents in 1900, while in 1909, notwithstanding the fact that the crop yield was the second largest on record, the price averaged 62.2 cents per bushel .

Since gold is the standard of value, or of deferred payments—the so-called unit being 23.21997 grains contained in a dollar—it follows that "value" is simply a ratio between gold (all forms of credit being contingent upon gold reserves)and commodities. Hence, the general average price of corn, cotton and all other products or commodities must necessarily continue to advance so long as the world's production of gold maintains its present unusual rate of increase.

The primary cause of the remarkable increase in gold production may be attributed to the discovery that a dilute solution of potassium cyanide is a rapid solvent for natural gold. Although the cyanide process, which made possible the almost complete recovery of gold, was patented in England as early as 1887, by McArthur and Forest, it was not generally applied until the early "nineties." Improvements in mechanical mining and the discovery of new deposits were also contributing causes to the general increase in production. China is known to be very rich in undeveloped gold deposits, and it is very probable that the regeneration of that country, which is now taking place, will be coincident with a large gold output. Japan is making extensive preparations for the exploitation of the Korean gold fields. Taking into consideration, therefore, the new mining operations throughout the world, the probable discovery of additional deposits in America and the likelihood that the numerous deposits of low gold-bearing sands will soon be made available, there seems to be every prospect for a continued increase in the world's gold production and a consequent further depreciation in the standard of value.

A depreciating standard causes a temporary disadvantage, because the prices of "finished products" and wages of labor do not advance relatively as fast as the costs of

"raw material" and food products, which condition is now causing a period of hardship for mill owners and mill workers during the process of adjustment. In the cotton industry the process of adjustment has become more pronounced, by reason of the short crop yield which confronts the spinner and weaver with the absolute necessity of making an advance in selling prices, in order that cotton may be again manufactured on an equitable margin of profit. The situation is further complicated by the fear that, whether the absolutely necessary advance in prices be accomplished by a "curtailment" or by a so-called "gentleman's agreement," it may, in the present unenlightened condition of the popular mind, be exploited unfairly by the importers and so-called "insurgents," to the detriment of the protective tariff on cotton goods. The first step toward dispelling the existing uncertainty which envelops the cotton industry should be that of forming a clear conception of the principles involved and gaining a popular recognition of the inexorable economic changes which have forced a permanently higher level in the prices of all raw materials. It must be borne in mind that these economic changes are also creating many new conditions, and furthermore, whereas the South was formerly financially impoverished, its planters and local bankers are now becoming practically independent and are no longer under the necessity of hastily parting with their holdings of cotton.

Some one has truly said that "all prosperity comes primarily from the soil, the mines, and the sea." Broadly speaking, rising prices, while being a disadvantage to bondholders and entailing a temporary period of hardship for certain other classes, ultimately mean the best for the great common good and a more equal distribution of wealth. Rising prices afford an opportunity for the surplus of workers in the over-crowded cities to return to the tilling of the soil, at which occupation they can, at the present and at the still higher prices of the future, obtain a degree of health, wealth and independence which is not possible under their present conditions. To the South in particular, with its relatively low priced but fertile farm lands and its equable climate, "gold depreciation," or continued rising prices, means an era of unbounded prosperity.

THE BUSINESS PROSPECT.

Published statements and interviews with prominent financiers, captains of industry and commerce and political economists at the beginning of the new year were all extremely optimistic and literally abounded with confidence that 1910 would be the banner year in the annals of our country. There was not a dark cloud in the sky, and everywhere on the horizon of economic activity the letters "prosperity" spelled assurance and promise to our ninety millions of people. The outlook was certainly most encouraging and the first few days of the new year confirmed the expert opinion.

New England had just concluded comparisons of gross and net sales, of gross and net earnings, and of expenditures for new constructions, extensions and improvements with the figures of previous years. Comparison of earnings with those of last year found railroad gross earnings increased nearly $300,000,000; railroad dividends and interest paid advanced $21,000,000; United States Steel net earnings increased $42,000,000; cotton spindles added in America amounted to 2,000,000, and the world's spindles were increased by about 8,000,000. In the South 20,000 new looms had been added during the year and nearly one million spindles with an expenditure of $21,000,000. Blue prints outlining extensions and new constructions were very much in evidence.

But conditions and actual economic developments during January and February fell far below the economic prognosis of the financier, the manufacturer, the captain of commerce and industry and the political economist.

The general disturbance throughout the country because of the high prices of food stuffs and other necessities, had a deterring effect on general business. The pending legislation at the national capitol, aimed particularly at further regulation of corporations, served to impress manufacturers with the wisdom of exercising caution and conservatism in operating their plants.

Bankers and other interests in New York became cognizant of the situation, and immediately advised conservatism. Stocks and bonds reflected the general feeling by seeking lower levels.

Buyers of commodities while unwilling to place new orders, did not care to cancel, because of the upward tendency of all commodity prices which led many to believe that replacements would be costly. This fact alone has done more to right the situation than anything else. All indications are that the period of uncertainty has been passed, and that from now on conditions will improve; but the year 1910 will probably not be the banner year. Buyers are becoming more confident of the future, and from now on we can expect the ship of prosperity to forge ahead with a good, safe pressure of steam.

MEETING OF THE SOUTHERN SOFT YARN SPINNERS.

The Southern Soft Yarn Spinners' Association held its annual meeting at Charlotte, N. C., on February 2, 1910, President L. D. Tyson, Knoxville, Tenn., presiding at the meeting. A resolution was passed urging spinners not to sell their products on the present basis of cotton and yarn, and also emphasizing the former basis of cones and paper, which has been the custom of the members of the association. The members were urged to continue the present program of curtailment until the price of yarns advances to a satisfactory basis. The annual election of officers was held and the following were elected:

J. E. Taylor, Kinston, N. C., Pres.; J. B. McMillan, Talladega, Ala., first Vice-Pres.; Robt. Chapman, McColl, S. C., second Vice-Pres. The election of a secretary and treasurer was postponed until a salaried man can be secured to attend to the more extensive work of those offices. On account of the large meeting held in Charlotte on January 4th, the meeting was not as largely attended as usual.

Consul Solomon Berliner, of Teneriffe, Canary Islands, learns that the West Africa cotton crop this season is estimated at 13,000 bales of 400 pounds each, as compared with 6,400 bales in 1908. The output of the gins is compact, neat bales of 400 pounds weight, which are easily handled, and have a density of 28 pounds per cubic foot. The Kano Railway will shortly reach the cotton-growing country of Northern Nigeria, and then large developments may be expected, for which ample funds will be required.

Southern Textile Association.

Meeting at Columbia, S. C., Very Successful. Many Interesting Papers Read. Next Meeting at Augusta, Ga.

The Southern Textile Association held its first meeting of the new year at Columbia, S. C., on Saturday, February 19th. Superintendents, overseers and others actively interested in the textile industry in the South to the number of over 150 were present at both the afternoon and evening sessions. A great deal of interest was manifested in the meetings by these representative men, and each successive meeting seems to eclipse the previous one in value.

The afternoon session was held at 3:30 P. M. in Craven Hall, being called to order by President C. F. McCall, Greenville, S. C. Mayor Reamer was represented by Gen. Jno. B. Frost, who delivered the address of welcome. Superintendent N. T. Brown, of the Pilot Mills, Raleigh, N. C., and ex-president of the association, responded. Many interesting papers were read by practical textile men, which were given careful attention by the members. Among the papers were: "Development of Welfare Work in the Southern Cotton Mills," by J. M. Davis, Supt., Newberry (S. C.) Cotton Mills; "The Spinning Room," by Geo. F. Brietz, Supt., Coosa River Cotton Mill, Bon Air, Ala.; "Cotton Carding," by L. W. Thomason, Charlotte, N. C.; "Power Plant Costs," by S. B. Rhea, Chief Engineer and Master Mechanic of the Louise Mill, Charlotte, N. C.; and "Benefits and Opportunities in Mill Life," by A. S. Winslow, Supt., Clinton Mills, Clinton, S. C. The paper of S. B. Rhea was ordered published in pamphlet form for distribution among the members of the association.

The evening session was held at 8 o'clock to hear several of the papers read. It was also decided at this session to hold the next meeting on July 2nd, at Augusta, Ga., After the business session, the members enjoyed a smoker and vaudeville. The local committee having the arrangements in charge consisted of W. P. Hamrick, Supt., Olympia Mills, W. A. Black, Supt., Capital City Mills, and C. R. Riddle, overseer weaving, Granby Mills. The program committee which has served for the last two meetings, was by a vote of the association requested to act in that capacity for the next session with power to appoint a local committee in Augusta for making the necessary arrangements.

BENEFITS AND OPPORTUNITIES IN MILL LIFE.

BY A. S. WINSLOW, SUPERINTENDENT CLINTON (S. C.) COTTON MILLS.

In commenting upon our recent paper on the "Care of the Operatives Health" a Western journal plays upon the threadbare note of child labor in the cotton mills of South Carolina, and waxes sarcastic upon the general subject of the employment of children, the loss of child play life, inferior surroundings and similar erroneous notions. In order to discuss this question intelligently one must understand the situation locally. It is unfair to the mill men of the South to condemn unheard, or, what is almost as bad, to condemn by drawing conclusions based upon conditions in far-off sections of the country.

To begin with, child labor, so-called, never meant labor in the sense in which adult labor is understood. The children employed in the mills in other days, ranging perhaps from seven to nine years of age, served as helpers to older persons, usually members of their own families. In due time these little helpers became in a business sense a nuisance, and the manufacturer himself has given material support in the direction and passage of restrictive child labor enactments. It was a glad day when children were

A. S. Winslow.

barred from the mills, that is, a glad day for the manufacturers, though it must be confessed that it was a sad day in many lowly homes. To understand just what is meant by this, one must have personal knowledge of what a lowly home in the South is like, and what it means to have its earnings reduced in whole or in part.

CHILDREN IN THE MILLS.

When writers talk about children and child play life in connection with mill life in South Carolina, it is well to explain that no person under the age of 12 is ever employed save in exceptional cases, such as lending support to a widowed mother, or something akin to it. It is probably true that the average age of young people employed is about 14 years, which means, as contrasted with the North, a boy of 16 and a girl who has already crossed the mystic line that separates the child and the woman.

To gain an idea of what the mill stands for to the poor whites of the South, one must go to the mountains and land lots, and study the conditions surrounding all that relates to child and adult life and living. If the writers who are able to solve problems with a toss of the pen a thousand miles away would only take the trouble to inves-

tigate they would quickly discover that the children of the wilds are taught sanitary and health measures for the first time in their lives in the mill village, and furthermore they do not know what real child play life is like until they have parted with their mountain shyness, and have been taught to play by the children of the mill village.

HEALTH OF OPERATIVES.

Now as to this matter of the health of the operatives. They come to us pale, sallow, anaemic, the actual and direct result of poor food and improper living back in what Dr. Stiles calls "the one-horse tenant farm." In the matter of medical attention they also suffer greatly. The right sort of medical attention is an impossibility. The doctor lives a long way off, and when he comes the patient must of necessity be satisfied with whatever remedies the medical man may happen to have with him. When these people enter the mill village they find things vastly different; they find at the outset good, wholesome food, improved methods of sanitation, physicians near at hand, drug supplies in the general stores; and in the larger mill places, resident physicians and pretentious drug stores.

Contrary to the general accepted opinion, the mill does not breed the diseases from which the operatives suffer most. As a matter of fact they bring their diseases with them, as has been certified to by competent medical authority. The improvement in their health is noticeable soon after their arrival in the mill village, and the reason is not hard to find. The mill is a healthy place of employment, and good food and regular habits of living work wonders in their physical appearance. The unprejudiced observer is quick to notice this, and does not fail to give credit where credit is due. To realize what the mill means in their lives one must see them on their arrival and watch the change that follows as they are brought under the influence of the spiritual, educational and reformatory agencies, fostered and encouraged in the mill village by the mill men themselves.

No man at all familiar with the subject will deny that mill men are interested in the spiritual and moral welfare of the operatives. The churches and chapels already in existence or planned for, the aid extended to clergymen, evangelists and district workers by the mill men actually and actively engaged in church and Sunday-school work, throw a new light on this scheme. Corporations are supposed to be minus a soul, but this is not true of all corporations. There are mill men who are genuinely interested in the welfare of their operatives. By this it is not to be inferred that cotton mills are designed to be spiritual reformatories or philanthropic institutions; on the contrary, the mill is run primarily as a business enterprise. But it is dawning upon the minds of the mill men that the agencies mentioned contribute to the making of bright, healthy and contented operatives. And as operatives of this class are superior to dull, unhealthy and discontented operatives, there is likely to be a greater giving, a wider extension of the helping hand in the future than even in the present, commendable though the latter be. The fact is, the life at the mill is a big improvement on the old life. The operatives never begin to live in the true sense until they become wage-earners. With all its claimed faults the cotton mill stands to-day the greatest benefactor, the mightiest single civilizing and uplifting agency in the life of the cotton mill operatives of the South that this class has ever known.

PUBLISHING TRUE CONDITIONS.

A textile journal intimates that information of what we are doing should be withheld from the public for the reason that it serves as ammunition for the labor agitator. It seems to us that this argument is unsound. The agitator has waxed fat on this way of doing things; our silence has been misinterpreted and misunderstood, and without meaning to do so, we have played into their hands. It is time to change mill tactics in this respect at least. Instead of allowing the public to be misled we need to stand up squarely in our own defense. By doing so we spike the guns of the labor agitator. A campaign of education will reveal that the cotton mill is not as bad as it has been painted. We shall stand higher in the estimation of the public by taking a clean, manly stand and letting the truth be known, and what is equally to our advantage we shall deprive the agitator of his opportunity to achieve any further notoriety at the expense of the mill men of the South.

OPPORTUNITIES IN THE MILL.

As touching business opportunities in the mill life, let use make a comparison between earnings on the farm and in the mill. Take a tenant farmer with three children to help him; if he makes eight bales of cotton and raises a hundred bushels of corn (which is averaging well), at 10 cents for his cotton per pound and 75 cents per bushel for his corn he receives $475 for his year's work. If the landlord furnished land, stock and tools, as is likely, he gets one-half for his share, leaving to the farmer and his family $237.50 as their income for the twelve months. Now, let the farmer take his family to the mill. He receives, say, 90 cents per day for 312 working days, or $280.80. The children all over 12 years of age work, say 300 days, at an average of 75 cents each per day, or $675, making the total income of the family for the year $955.80. On the farm they eke out a bare living. Luxuries and special advantages are unknown. There is no money until the crops are sold. When the bills are paid there isn't a dollar left.

It isn't like that at the mill. They receive their wages at the mill every two weeks, have good food and plenty of it, enjoy comforts unknown on the farm, possess advantages impossible in the old life, and are able to lay up something for a rainy day besides. Is it to be wondered at that people leave the farm for the mill? In making the change they have nothing to lose and everything to gain, and so well is is their coming to be understood that no amount of talk from "muck rakers" or labor organizations can keep them away. Why should labor in the cotton mills be looked upon with disfavor? It certainly is clean, honorable employment. Though classed as poor whites, the operatives are native and to the manor born. In the mill village they are actuated by the same principles, governed by the same motives, cherish the traditions common to all in South Carolina. They come of Revolutionary stock. Their fathers fought in the war between the states. They are the children of men who sacrificed their lives, their all, for the Southern cause. Misfortune, inability to make a living elsewhere brought them to the cotton mill. Is there any good reason why they should not labor and hold their heads just as high while striving to better their condition? The time is not yet, and we pray God it may never be, when character and nobility of purpose is measured in dol-

lars and cents. The operatives should be judged on their merits. It is devotion to honor, patriotism and the practice of the virtues that make a people great. No insinuations or reflections need be cast upon workers of this stamp.

The elevation of the operatives along religious, moral and educational lines will be found of manifest advantage. The higher the operatives rate in intelligence the higher the quality of goods produced. It is the intelligence that governs and directs the machine, and not the machine itself that stamps character upon the goods manufactured.

A closing word: The mill offers a chance to climb the ladder of success not to be despised; any young man of good character, bright, painstaking and the possessor of ordinary intelligence can master the business of manufacturing cotton cloth in ten years' time. The man who understands his business in the mill is always in demand. The pay of a good overseer is from $1,000 to $1,500 per year, while a good superintendent receives from $2,000 to $6,000 per annum. They make a better showing in a financial sense than those who have spent years in training in college halls, graduating in debt and struggling for years on much smaller incomes while trying to gain a footing in the world. The mill man is paid while receiving his education, and graduates into a higher salaried position.

It is plain, gentlemen, that there is another side to the cotton mill question, and for one I believe that we elevate the mill and honor ourselves at the same time by making this side known to the world.

WELFARE WORK AT THE MILLS.

BY J. M. DAVIS, SUPERINTENDENT NEWBERRY (S. C.) COTTON MILLS.

I propose to discuss this subject from the aesthetic, spiritual, moral, social and physical standpoints. I am aware of the fact that this sounds quite presumptuous, but the more I have studied the deep and practical solicitude which the officials of the Southern cotton mills have exercised for their loyal employes, the more imperative has seemed to me the necessity to consider this question from the five view-points mentioned. To omit any one of these five phases of this subject would be to come just that far short of getting a comprehensive view of what has been and is being done. It will not be my purpose to flatter ourselves nor to try to answer the multitude of ridiculously silly criticisms heaped upon us by those who are not conversant with existing conditions. I shall confine myself to such facts as I know to exist through my own personal observation, or through such authentic sources as can not be questioned.

MILL OFFICIALS ARE PRIME MOVERS.

It is not stating the fact too broadly to say that every successful and progressive cotton mill official to-day is deeply and vitally concerned about the higher ideals and the all-round development of the whole personnel of the mill village. These people have already reached a point where they are among the most useful citizens of this rapidly developing section of industry. It is not a new thought so much, as the possibility of carrying out an older belief that it was necessary to have ideal surroundings in order to have healthy, happy, prosperous and contented employes. It is an injustice to the men who have been managing and developing the cotton industry of the South to insinuate that this great burning truth as well as a necessity is just now beginning to warm up the hearts and consciences of these men. Strikes unknown, arbitration unnecessary—there is found a people doing an honest day's work and receiving an honest day's salary; willing to live and let live. With no friction having come between employer and employe, their wages have increased within the last few years more than 50 per cent.

WHERE OPERATIVES CAME FROM.

In order to more fully appreciate what has been and is now being done, it will now be necessary to consider briefly the conditions and environments of those who came to the mills ten and fifteen years ago. These people were honest, hardworking people, and in most cases extremely poor. In some instances they came from floorless cabins with perhaps only one or two rooms, only one or two small openings in the walls for windows, and a large open fireplace for heating and cooking. A few old boxes, a chair or two, one or two beds, and perhaps an old table with a couple of chairs and an old slab bench composed the entire household furniture. Their bath room for the morning toilet was the nearby branch. The children had absolutely no advantages. The church and the day school of a couple of months' duration, were perhaps several miles away. They had no books or newspapers in the home. The sound of music was almost unheard except from a home-made cat-skin banjo. There was little in such a home to foster the higher traits of human character—such as modesty, culture and a desire for social development. These conditions may be extreme, yet many came from just such places of abode, while still others, a little more fortunate, were forced to the mill in order to save the old home from being sold under mortgage long past due.

There is a transforming and awakening to new life when they move to a first-class mill, and are brought under the influences and permeated with the spirit of "welfare work," which means that so far as possible they shall be brought under protection, shielded from misfortune, sickness, calamity and evil, and shall enjoy health, happiness, prosperity and the blessings of society and civil government. They find themselves under influences which brighten and intensify their lives, and a development of the whole man and woman is the consummate result. Not only do the poor come from the lowlands and from the mountains seeking a better occupation and a fuller life, but it also happens that a class of people above the average well-to-do class turns to the mill seeking a livelihood because they find there constant work with satisfying remuneration. The constant contact of these two classes one with the other blends the whole into a community that must be respected for its integrity and admired for its honesty. The cotton mill turns out not only yarn and cloth, but it turns out also American manhood and womanhood of a very high type.

WELFARE WORK AND ITS RESULTS.

Many advantages and improvements have been added to the mill villages with in the past few years. Many varieties of shade trees are planted along well laid off streets. Instead of rows of boxed houses that marked the cotton mill architecture in the years following the war, a modern mill village has along these shaded streets splendid dwellings of different designs, finished well inside and out, painted nicely and of different colors. The village is thus made to resemble a little town, where individual taste seems to have prevailed. These houses are exceedingly comfort-

able, and are far better than the average country home. Surface water is no longer used for drinking purposes, but artesian wells are sunk and water is supplied either within the home or within close proximity to it.

School buildings have been erected, equipped with up-to-date furniture and school fixtures, and supplied with first-class teachers—all by the mill management. Children between the ages of six and twelve are required to attend these schools. Many older children also attend these schools. Night schools furnish young men and girls opportunities to improve in reading, spelling, arithmetic and textile studies. Every modern mill village also has a boarding house which will do credit to buildings going sometimes under the name of hotels. These boarding houses are designed for single ladies or gentlemen, who were formerly forced to seek quarters that were not at all convenient or comfortable. These boarding houses have anywhere from 15 to 25 rooms, equipped with every modern convenience, including bath rooms, parlors, reading room and electric lights, and in many instances steam heat.

The little union church, with its uncomfortable little narrow seats with straight backs, has been superseded by the elegant denominational church, furnished with comfortable pews, electric lights, and in so many instances heated with either steam or hot air. Many of these churches support their own minister—taking his entire time. The minister is furnished a well constructed and cozy parsonage, and he lives among the people of his church. He is as a rule a man of great influence. Many of the mill villages have well equipped hospitals. In some instances they have taken up this important work at great sacrifice. One of the best hospitals in the city of Spartanburg is the Good Samaritan on the Spartan mill hill. I am not sure but what this hospital was the first hospital erected in that city.

RECREATION FOR WORKERS.

Club houses with reading rooms, where the leading magazines and newspapers and many books are found furnish opportunities for both social and educational development. Politicians can tell you better than I can how difficult it is to fool mill operatives upon public issues. Sitting within the legislative halls of this ancient and historic commonwealth are men who have quit the mill to become statesmen. These club houses are equipped with excellent gymnasiums, bowling alleys, pool tables, bath and game rooms of various kinds. Library associations, entertainments, fraternal organizations, all help to keep our mill people abreast with modern civilization. Swimming pools for both men and women are being added to the attractions in many mill villages. Possibly the greatest amusement and enjoyment in a mill village is the national game. Baseball is practically universal among these villages. Some of our cities can learn lessons of enthusiasm, and how to stand by their teams by watching these mill teams, for I have never seen a mill yet that didn't have the best baseball nine. If they won they did it through skill—that's all; and if they lost it was the umpire's fault. Another enthusiastic organization encouraged by the mill management is the brass band. Under the able direction of skilled musicians we have developed some of the best brass bands in the South. I have in mind now a mill band of Newberry, S. C., which had the distinguished honor of being engaged by another State to play for the entertainment of the president of the United States.

Many of our mill villages have beautiful parks set in flowers and shrubbery. Of course these parks differ in size and beauty, but many of them will do credit to our cities. Here may also be found animals and curiosities that furnish not merely amusement, but lessons in natural history as well. Rustic seats, summer houses and skating rinks make these grounds attractive. The mill operative is thus taught in many ways to love the beautiful, the neat and the clean. If further proof is needed it will only be necessary for the skeptical to visit a department store of an up-to-date cotton mill and examine the class of goods kept.

Next, the spiritual side is quickened by church facilities and resident pastors. The moral is akin to the spiritual and is developed by the former. But the mill management deserves special praise for the premium they have always put upon morality among the operatives. No woman with questionable character is allowed to stay on the mill hill, much less to secure employment in the mill. The social nature is possibly more highly developed among mill people than among any other class. It is brought about by their frequent associations in the mill itself, by their social clubs, fraternal orders, music organizations and sports of different kinds. The physical man and woman are developed by the very nature of their work under sanitary conditions, by improved methods of living, by swimming pools and healthy outdoor sports. The mill family under these favorable conditions and influences is a family of the old type that this nation used to be so proud of before the dollar took the place of a man. You will find sterling qualities of head and heart in the cotton mill family. This family, living under improved sanitary conditions and surrounded by wholesome and elevating influences, possesses a marvelous degree of nerve vitality and stored up energy. I speak of this because while I believe that the South is a glorious section of this country, and that cotton manufacturing is the important industry of the South. At the same time I believe that the development and wise direction of this tremendous energy in the cotton mill population is of the utmost importance. This will prove, first, a blessing to them; second, to us, and, third, to the South.

BENEFITS OF WELFARE WORK.

The criticism has been offered that all the progress made in "welfare work" has been prompted from a purely selfish motive. This is an unfounded as well as an unfair criticism. A high sense of duty has been the controlling motive. Those in authority, realizing the great responsibility of their positions, and knowing that they occupy a position which places largely within their power the shaping of the destiny of thousands of girls and young men—these men have determined that yarn and cloth shall not be made with a sacrifice of morality and human life; but that along with the yarn and cloth shall be developed manhood and womanhood of no mean type. I know, as well as any one else, that from the great progress made in "welfare work" there have accrued great advantages to the mill management; but the first and great advantages have been to the toiling masses, and only indirectly to us. That this motive has been selfish instead of philanthropic I most emphatically deny.

The presidents of this great manufacturing industry, realizing their responsibility, determined to create environments conducive to the healthiest body, mind and soul of their employes. They have simply subscribed to the belief that the keystone of life's arch is helpfulness. Cotton mill industry and labor is becoming more and more dignified. If the South is going to be great, her cotton

industry is going to be still greater. Our possibilities for doing good to others and to ourselves are practically unlimited.

THE SPINNING ROOM.

BY GEORGE F. BRIETZ, SUPERINTENDENT, COOSA RIVER SPINNING CO., BON AIR, ALA.

In comparing the spinning frame of to-day with the one of 1880, or about 30 years ago, we notice many changes and improvements. Perhaps the greatest improvement is in the spindle itself. At that time the common spindle in use was about 12 to 14 inches in length, and weighed about one pound; had to be oiled twice a day at the collar, and three times a week at its base or step, making 15 times each week that the spindle must be oiled. Its speed at its best, was about 5,000 revolutions per minute. The spindle of to-day weighs about 7 ounces and runs from 5,000 to 10,000 revolutions per minute, and needs oiling only once in from three to four weeks. Then, many of the running gears were left exposed, and as a result many fingers and hands were the trophies laid on the altar. Now, practically every running gear is enclosed.

IMPROVED CONDITIONS.

This thought leads to other considerations in favor of the spinning room of to-day. Then, many children from 8 to 10 years of age worked, or were confined in the mill from 6:30 A. M. until 7:30 P. M., as against a prevailing 10-hour basis at the present time. Now, every one who has been in a mill for over 10 years can recall the marked changes. In behalf of the small spinning room help, certainly our legislators with the aid and sanction of the mill management (and sometimes without it) have made wise laws, in prohibiting children under 12 years of age from working in the mill, and also in prohibiting those under 14 and 16 years of age, who have not had some chance at an education.

The environments in mill and village have been greatly improved, relative to both health and morals of the employes. Twenty-five years ago, the prevailing rule seemed to be based on the three "ds," namely: damning, docking and discharging. This custom has now been largely displaced by system. The writer doubts if there is a class of laboring people to be found, who are more responsive to religious training than the Southern cotton mill help. The Sunday-school has proven itself to be a very valuable asset to every mill village.

SYSTEM IN THE SPINNING ROOM.

There is perhaps more system needed in the spinning room than in any other department, largely on account of the youth of the operatives in the spinning room. There should be a time and system for everything; a time to pick rollers; say, the time set is 9:30 for the second hand to inspect the rollers. The help very soon learn if the rule is to be carried out, and govern themselves accordingly. There should be a time to fan off sides; a time to pick clearers; a time to wipe guides or thread boards, or creels; a time to pick steel-roller stands and also to wipe the steel rolls. In a room where system has not been inaugurated or maintained, if an overseer will ask a spinner why she has not done this cleaning, the answer would very likely be "Haint had time," while as a matter of fact they would find after the system goes in, that they could not afford not to do it.

Time required for an average good spinner to clean six sides would be about as follows:

To fan off 6 sides with hand broom—2 minutes.

To pick clearers on top flats—4 minutes.

To wipe guides or thread boards—3 minutes.

To wipe creels or roving boards, top and bottom—7 1-2 minutes each.

Doffers should clean off the heads and ends of the frames; also the rocker arms and weights after the first doff each morning, and if on coarse work, at noon also. They will still have ample time left for playing ball, or more profitable investment.

UNEVEN YARN.

A system of cleaning and keeping clean in the spinning room, will go a long way toward solving the problem of uneven yarn that is caused in the spinning room. Uneven yarn may be classed under two headings: variations from

GEORGE F. BRIETZ.

the standard number, and variation or unevennness in a single thread. We believe that it is generally conceded that the greater number of causes of variation from standard number may be attributed to the card room; these specific causes we will not here enumerate, as this paper is bearing specifically on the spinning room, but the greater number of causes of the unevenness of a single thread, we think, are safely chargeable to the spinning room. To enumerate a few of these: 1st., rolls choked in cap bars; 2nd., top rolls out of alignment; 3rd., bad joints in cementing cots; 4th., one end of roll larger than the other; 5th., slack bands; 6th., different sizes of bands; 7th., dry spindles; 8th., waste wrapped around top of spindle whirl causing slippage of the bobbin; 9th., rings too large for number being spun; 10th., draft too large; 11th., misfit bobbins; 12th., gears too tight; 13th., carelessness in wiping off; 14th., cleaning neglected; 15th., guide wires out of true; 16th., travelers too heavy; 17th., travelers worn; 18th., improper atmospheric conditions cause work to run

badly. With the improved method of controlling the humidity in the room in comparison with the old goose can system of 25 years ago, the excuses for bad work in the spinning room are gradually lessening.

The old adage, "A stitch in time saves nine" is very applicable in the spinning room of to-day. A good practice for a practical spinner is to weigh at least once a week (oftener will be better) a sample bobbin from every spinning frame under his care, and set down the weights as he weighs them consecutively. The result will be two-fold, namely, he will quickly detect the amount of variation in different parts of the room from any cause, whether accidental or otherwise. If a wrong gear should have been put on, he will soon detect it before it works very long. This will be a good investment of time; he can easily size every frame in his room whether he has 20 or 200 frames, in one and one-half minutes to the frame. Another safe and beneficial rule, especially if he be running a small room, will be to size a sample bobbin from the first doff, or certainly during the first day, from each frame that he has ordered changed.

WATCH THE DETAILS.

The use of hooks in a spinning room is almost as damaging as a knife is on bobbins. Where this is allowed, the best method for the use of the hook is to have the second hand give them out at a stated time each week, to be used for the cleaning of steel rolls-stands only, and then collected and put away until next stand cleaning day.

Proper care of belts goes a long way toward getting full production, there are many good dressings, but a weekly application of a little vegetable castor oil will preserve the belts and create the impression of "something doing." Travelers play an important part toward getting both quality and quantity. The writer believes in a systematic time for changing all of them; also in having a systematic time for oiling all spindles, and not a few sections each day.

WASTE.

Every spinner knows that the more waste he makes, to be ground up and come back to him in stock, the worse his work will run. The fiber being so short will fly off and make it harder on the spinner to keep the work clean. On coarse counts of hosiery yarn, 1 per cent. is ample waste for a spinning room to make, to be returned to the picker room.

String waste, the most costly of all waste, if it must be made, make it as sparingly as possible and, keep it clean by keeping it off the floor. In a weekly production of say, 25,000 pounds of No. 14s hosiery yarn, from 1/4 to 1/3 of 1 per cent., or 75 pounds is ample. If knives are allowed in the winder room, this amount will be easily doubled, or even trebled. This matter of string waste on the winders is a matter which will be largely decided by the kind of piecing and winding the doffers do. The best plan is, to have doffers put thread in the travelers first, then as the yarn winds on the bobbin it won't go higher than the top of the ring. Don't allow winders to use knives; teach the doffers to be careful in winding the yarn on the bobbins and there will be no need of a single knife in the winder room. Good yarn can be delivered to the winder room, and by carelessness in tension can be badly injured if not ruined.

POINTS.

A systematic inspection of bobbins should be made, and defective ones should be burned. This is a mighty good investment and pays very handsome returns, costly as it may appear.

On cone winders frequent tests should be made by the man in charge to see that each drum rises clear and stops whenever a thread breaks, or a bobbin runs empty; otherwise the cone will run on and on and chafe the yarn. A man can easily inspect 500 drums in one hour.

If cones are made of a strict gauge a variation of from 5 to 8 pounds is sufficient. If cones are not made strictly to gauge and a little carelessness creeps in, a case of 350 pounds standard weight will vary from 10 to 25 pounds. In packing the cases each cone should be inspected, either when taken down from winders or when being wrapped. Cases should be tightly packed as one so packed travels better than a medium packed case. After cases are packed and nailed they are ready for the stenciling brush. We believe that it is generally conceded by manufacturers that it requires more watchfulness and care to run a hosiery yarn spinning room than a spinning room where the product is to be woven at home, because any one day's production is liable to go to a different customer. Therefore, in conclusion eternal vigilance and system in the spinning room are the price of liberty and freedom from kicks on yarn.

POWER PLANT COSTS.

BY S. B. RHEA, MASTER MECHANIC CHADWICK-HASKINS MILL NO. 4, CHARLOTTE, N. C.

It is my intention to give the costs of installation of power plants used in driving cotton mills both with electricity and steam, and I will undertake to give it as correctly as it can be obtained. I have a reason for presenting this paper before this excellent body, in that a contention was made in a previous meeting that it takes $65 per horsepower to build a modern steam plant and $11.50 per horsepower to equip a mill electrically.

Let us consider a mill of 55,000 spindles, and go into the detailed cost of all the apparatus in each drive on the steam side, including engine 32 and 64 x 60 inches, cross compound condensing complete, foundation condenser, all necessary pumps, all piping, boilers, stack or chimney or induced draft, engine room building and boiler room building, also drive to main line shaft, and add to this the installation of the same. And also on the electric side to consider all costs, price of motors, switch boards and all material, and also the cost of installation.

STEAM PLANT—COST OF INSTALLATION.

I have here a proposition in the way of a letter from a well-known engine builder who will build and erect on purchaser foundation, together with modern water tube boilers, all pumps, including condenser, and all necessary boiler feed pumps; this equipment to consist of a 32 and 64 x 60 inch cross compound condensing engine with an initial steam pressure of 155 or 160 pounds, running 80 or 85 R. P. M., and jet condenser, all connected and ready to run, for $85,000; and the rated power of the machine is 2,500 horsepower, which will come at the rate of $34 per horse-power.

I have here blue prints showing the foundation of an engine of this size—32 and 64 x 60 inches, for running at 80 or 85 R. P. M., and also will add that there are several engines of this size running on this very same foundation's plane in the Carolinas. This foundation stands 13 feet above the level of the ground, one foot of concrete footing

covering 42 x 46 feet. I had an estimate made by a contractor of this kind of work and who does a $100,000 business annually. I have a letter from him giving his estimate at $3,165.50, or at the rate of $1.26 per horse-power; this includes foundation for engine and condenser. In this lay-out I will estimate an exhaust fan. I have information from a manufacturer, where a fan of ample size for boilers of this capacity would cost $1,260, including automatic regulating valve and installation, etc., or at the rate of fifty cents per horse-power.

It seems to be a question among operating engineers as to which they prefer, high chimney, or exhaust fan and economizers, but there seems to be no question among the mechanical engineers as to the installation of a fan. It is claimed by engineers that a good mechanical draft will give better and smokeless combustion from any kind of fuel, or cut the cost of fuel by utilizing a cheaper grade of coal. With plenty of draft under control, it is possible to burn soft or hard coal slack or the cheaper Western coal. With proper furnaces and mechanical drain, this may be done with high boiler efficiency and with little smoke.

One horizontal smoke connection 90 feet long, 9 x 9 feet at the large end, having uptakes 18 x 48 inches, with dampers all erected, would cost $1,350. A smoke stack 45 feet high, 7 feet diameter of 3-16 steel with suitable band

S. B. RHEA.

guys, etc., erected, would cost $525. This makes $1,875, or 71 cents per horse-power.

To build a chimney 175 feet high and 9 feet inside would cost $7,500, or $3 per horse-power. Besides this, the engine room building 44 x 70 feet, 13-foot basement and 22-foot story in engine room, cost including gravel roof, trusses and boiler room 44 x 115 feet, everything complete, would cost $2,465, or in round numbers, $1 per horse-power.

Among other things you will have to have plenty of cool water for condensing purposes. There are two ways of getting this: One way is by having a large body of water and handling it every three or four days, giving it ample time to cool. And the other way is by the cooling tower, and using a small amount of water, just taking the minimum of water used for fire protection. On inquiring into the cost of a reservoir, I find that it is always fixed by surroundings. I find in most places they have natural conditions and the cost runs down as low as 25 cents per horse-power. The writer knows one of the large mills in South Carolina that is situated in one of the leading towns, where the reservoir cost was as low as 10 cents per horse-power, and others that are situated on watercourses that cost merely nothing.

In using the cooling tower, you would want, for a 32 and 64 x 60 inch engine, say 37,500 pounds of steam, 26-inch vacuum, 75 degrees atmospheric temperature, and 70 degrees relative humidity, a tower that would cost when complete about $9,000. Such a tower has four 120-inch fans, each pair of fans requiring 24 horse-power, or a total of 48 horse-power, and this horse-power at 12 cents per horse-power would increase the operating expense 23 cents per horse-power.

Now, in comparing the tower with the reservoir, I would prefer a reservoir up to this cost of tower, and if found that the water supply and natural conditions were such that you could not build a reservoir I would install a cooling tower at the cost of $3.60 per horse-power.

ECONOMIZERS.

Economizers are not necessary. I mean that in building a steam plant it can be built without the economizer, and they are put in only for the simple reason—to reduce coal consumption and possibly increase boiler capacity also. The builders claim and guarantee, I think, a saving of 10 to 20 per cent. by their installation. And if it were for comparison against any other prime mover, the amount taken to complete the installation should not be accounted for unless the saving was taken into consideration.

But, at any rate, we will consider the cost. Economizers with 700 pipes would cost approximately $9,800, or $3.92 per horse-power for a 2,500-horse-power engine. For an engine of this type and size, with proper rope wheel and with jet condenser and all piping between the condenser head and hot well the engine being delivered and erected on purchaser foundation at competitive point in the Carolinas, would cost $13.67 per horse-power. The piping for condensing would cost $3.70 and the steam pipe to the boiler room could be installed for ninety cents per horse-power.

To summarize the cost of installation, per horse-power, we have:

Engine and condenser	$13.67
Piping, etc.	3.70
Fire tube boilers	5.00
Installing fire tube boiler	1.82
Fan and stack	1.21
Foundation	1.26
Boiler pumps	.25
Economizer	3.92
Drive	1.00
Pipe in to boiler	.90
Pipe covering	.50
	$33.23

GROUP MOTOR DRIVE.

We will now consider a motor drive on a basis of 2,300 volts, 60 cycle, 3-phase inductive motors for ceiling sus-

pension for a 55,000-spindle mill.

The motors would be divided as follows: 10 motors of 150 H. P.; 8 motors of 100 H. P.; and 5 motors of 50 H. P. This gives a total of 2,500 horse-power. For this is needed one incoming line panel, three feeder panels, and 23 oil switches for wall mountings, one for each high voltage motor. The total cost of this apparatus delivered in Charlotte is $28,687, or $11.25 per horse-power. These figures do not include installation or wiring and possibly it can be done for $2.60 per horse-power, making the total cost per horse-power equal $13.85.

INDIVIDUAL DRIVE.

In the individual drive we would have 220 motors for the 220 spinning frames, 250 spindles to the frame, which would give the mill 55,000 spindles; and the average spinning frame takes five horse-power; this will give us 1,100 horse-power or 821 K. W. All these motors are small. They can not, of course, operate on high voltage and we are compelled to figure on 220 or 110 volt machines.

This 1100 horse-power will require 821 K. W. to be stepped down from 2,300 volts to low voltage. Therefore, we need 220 five-horse-power motors and 821-K. W. in transformers, and with a small switch mounted on a slab for starting purposes. The total will cost in Charlotte, $18,535 or $16.85 per horse-power.

In addition to this, we have left 1,455 horse-power for the pickers, cards and weaving. Figuring this end of mill then at the price as covered by the case of group drive at $11.25 per horse-power, you have this $16,367. This amount added to $18,535 for the spinning room gives $34,902. The wire and installation cost $7,650. This gives $16.70 per horse-power.

To summarize, we have the steam plant installation to cost $33.23 per horse-power. Group electric drive costs $13,85 per horse-power, and individual electric drive costs $16.70 per horse-power.

NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

The Board of Governors of the National Association of Cotton Manufacturers, at a recent meeting, voted to hold the 88th meeting of the association on Wednesday and Thursday, April 27th and 28th, at Mechanics' Fair Building, Boston, Mass. The Textile Exhibitors' Association, which will hold an exhibition of textile machinery and accessories in that building during the last week of April, extended the use of the building to the National Association.

The program for the meeting is being arranged but will not be issued until shortly before the meeting. Several prominent specialists on cotton finishing have been asked to contribute papers. Wm. B. Hawes of Fall River, Mass., was elected to fill the vacancy on the committee of Standard Specifications for Staple Grey Goods, which was caused by the death of Albert M. Goodale.

The National Association of Cotton Manufacturers was fundamentally established in 1854 as the Hampden County Cotton Spinners' Association, which, outgrowing the local limitations suggested by its name, became in 1865 the New England Cotton Manufacturers' Association; and like reasons caused the change to the present name in 1906. It was incorporated in 1894.

The present organization has become more than national in its scope, having over 1,000 members distributed throughout all the cotton manufacturing districts of the United States, and also in foreign countries.

This membership consists of those who are devoted to matters connected with cotton manufacturing either directly or in its subsidiary lines. Slightly over half of its membership consists of persons primarily engaged in the financial side of cotton manufacturing, and the remainder are occupied with the technical side of manufacture of cotton. For the whole organization, 477 are those whose duties are primarily financial, 438 mechanical and other technical elements of the business, and 83 miscellaneous.

Although the membership in this Association is individual, yet as an indication of the interests with which they are affiliated it should be stated that the capital stock of the various textile mills, print works and bleacheries with which these members are connected, amounts according to information obtained from the most reliable sources available, to $360,000,000. These mills have about 23,000,000 spindles, 1,750 sets of woolen and worsted cards, 6,400 knitting machines and 96 printing machines.

The amount of capital in the affiliated industries of cotton cloth, cotton, textile machinery, supplies, etc., represented by those in the associate membership amounts to $430,000,000 as nearly as can be ascertained, making the whole capital represented by the membership of this Association, $790,000,000.

The purpose of the Association is the advancement of the cotton manufacturing interests and the body commends itself to every one interested in the subject. It exerts strong influences in the direction of its commercial relations, and in this respect has special claims for the sustaining influences of those engaged in cotton manufacturing. Its primary work in matters pertaining to improvements of manufacture has always been a leading feature.

The annual meetings are usually held at Boston on the last Wednesday and Thursday of April, and the semi-annual meetings are held in September or October at some rural resort where, in addition to the sessions, the members have opportunity for further acquaintance. At these meetings papers are presented on live issues of the subject, which are contained with their discussions in two volumes of published reports amounting to about 800 pages, which are distributed to the members.

The membership consists of active members are those engaged as a proprietor or in an executive position in the manufacture, printing or finishing of cottons. The fees for active members are $10 admission, and $5 annual dues.

Associate members are those engaged in industries subsidiary to the cotton manufacture, or the manufacture of textile machinery. The admission fee for associate members is $25, and $10 a year for dues.

CONVENTION DATE CHANGED.

Secretary C. B. Carter, of the National Association of Hosiery and Underwear Manufacturers, has sent out notices to the effect that the date of holding the annual convention and exhibition of the association has been changed from May 16-20 to May 23-27. The change of dates was made largely on account of the fact that the annual convention of the American Cotton Manufacturers Association will be held in Charlotte, N. C., from May 17 to 19, and as certain of the Southern members of the hosiery association and many of the machinery, yarn and supply representatives are anxious to attend both conventions, it was deemed best to have no conflict in the dates.

THE USE AND ADVANTAGES OF SUPERHEATED STEAM IN COTTON MILLS.

(Contributed exclusively to COTTON.)

BY E. L. PENRUDDOCKE.

It is very important that cotton manufacturers should give particular attention to the question of superheated steam, as the subject is one which has direct bearing on both economy of operation and capacity of output. Superheating apparatus has now reached such a state of perfection as to be free from suspicion of unreliability, and there is now available sufficient information and general data derived from actual experience with this form of apparatus, not only in cotton mills, but in other industrial establishments, to justify the expectation that a considerable outlay of money might be made without risk of a failure and consequential loss.

It might be well to explain what is meant by superheated steam. Steam, as ordinarily spoken of, is saturated steam which is the gas formed by the application of heat to water after the boiling point has been reached. The temperature of saturated steam depends upon the pressure; thus, for 100 pounds pressure, as in a boiler, for instance steam when formed, would have a temperature of 337 degrees Fahrenheit; at 150 pounds pressure, steam would have a temperature of 365 degrees fahrenheit, and so on, increasing with the pressure. Steam in this state, as is ordinarily used, is ready to condense and revert back to the state of water, with the slightest loss of heat. It is impossible to utilize steam in any way, or even to hold it in a vessel surrounded by a lower temperature without a loss of heat. Therefore, we have in steam an unstable gas which is always condensing unless heat is being supplied from an outside source. It is possible, therefore, after steam has been formed from water at a temperature which is fixed by natural laws, to further increase this temperature by the application of additional heat. The instant the temperature is increased beyond the saturation point the steam is superheated. And in this state it has the properties of a perfect gas and may be increased in temperature indefinitely without any increase in pressure beyond the boiler pressure at which it is generated. Thus the effect on steam, when the temperature is allowed to remain constant, is to increase its volume and to decrease its weight in direct proportion to the absolute temperatures, or according to the law of perfect gases. It is because of these new properties which superheating gives to steam that it is beneficial to use it in this state for driving engines, boiling water or drying of cloths. It is because steam can be received at ordinary boiler pressure or even at an increased pressure and superheated to any desired temperature, even as high as 800 degrees Fahrenheit, without any increase in pressure and in this form that it possesses great advantages for boiling water and for drying purposes.

The use of superheated steam for drying purposes presents a different phase of the question as regards the saving in fuel obtained thereby, from that of using it for power purposes. Here it is not so much a matter of economy in fuel consumption, but rather an increase of output which is obtained. Then it is true that steam of any pressure may be superheated, and therefore, exhaust steam, even at atmospheric pressure, or slightly above, may be passed through a superheater and the temperature raised to 800 degrees Fahrenheit. Thus by using steam at this high temperature, the drying process is considerably expedited. One plant of this kind is in operation in the East where they take the exhaust steam at about five pounds pressure and heat it to 600 degrees temperature. And it should be understood that the drying of the heavy cloth at this plant is done in about one-third less time with superheated steam than prior to its use. This means fifty per cent. more output from one machine, simply by the use of superheated steam.

The European manufacturers of cotton and woolen goods have made extensive installations in their plants, and the system is strongly advocated abroad. It is now being considered and installed by a number of the leading cotton mills in the East and South. However, it is only within the last six or seven years that the manufacture of superheaters has been seriously taken up in this country, the greatest demand having been for the equipment of electrical plants. At this date there is upwards of two million steam horse-power in use in various industries, such as water works, sugar refineries, soap works, packing houses, carpet manufacturies, cotton mills and a variety of others.

There is one very important factor to be taken into consideration in superheating steam, and that is that the temperature must be uniform; this can only be accomplished by what are known as controllable superheaters. This control is effected either by the circulation of feed water

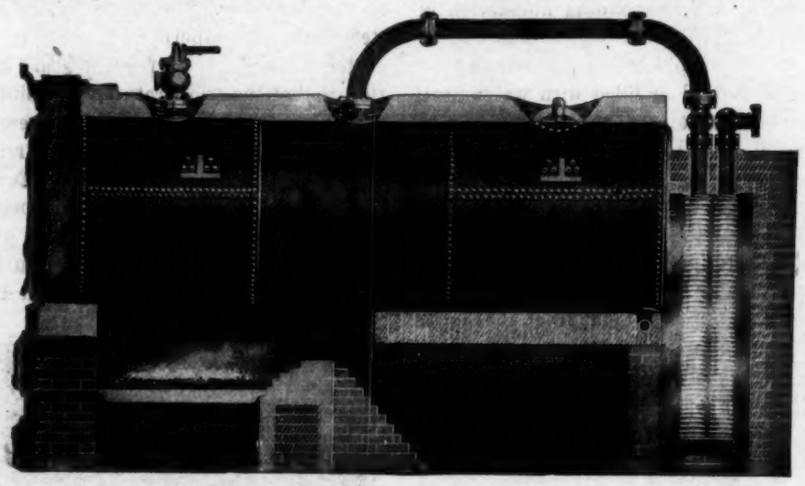

FIG. 1. PROTECTED TYPE SUPERHEATER, ATTACHED TO A HORIZONTAL RETURN TUBULAR BOILER.

through an inner pipe or by means of a mass effect. The small tube, or bare tube type superheater, does not give a uniform superheat, due to the fact that the temperature of the escaping gases (when superheaters are attached to boilers) fluctuating, which fluctuations are necessarily reflected on the tubes, causing a corresponding fluctuation in the temperature of the steam. Another objection is that in firing up the boiler, or rather placing it in commission; the superheater has to be flooded or filled with water until working pressure has been obtained; then it has to be drained and the steam allowed to pass through it. This is a source of considerable trouble, due to the sudden expansion and contraction, and also to the trouble derived from the interior of the tubes becoming coated with a scale, and their construction necessarily makes it difficult to clean. Therefore, there is a liability of their burning out and from leaks, due to the formation of scale and from the undue expansion to which they are subjected. It is, therefore, absolutely necessary in order to obtain proper results, to use only the controllable or protected type superheaters.

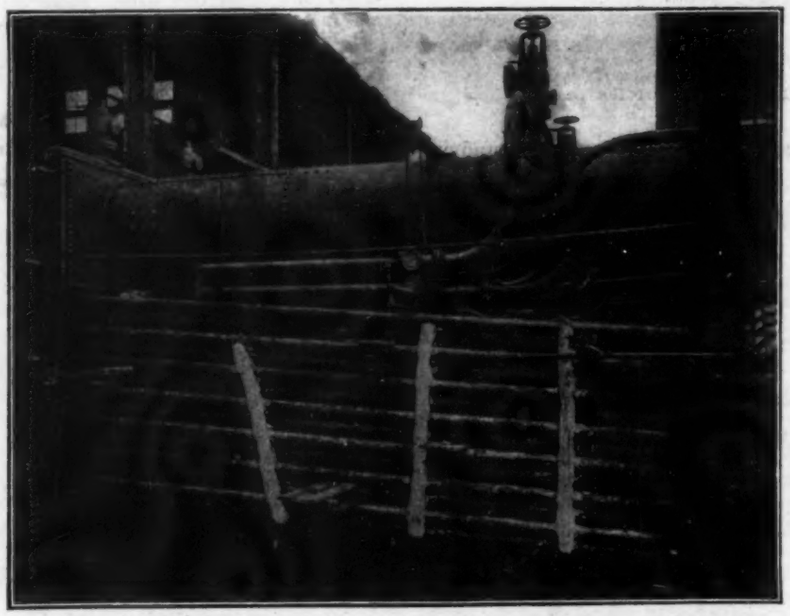

FIG. 2. PROTECTED TYPE SUPERHEATER ATTACHED TO A WATER TUBE BOILER.

When this type is attached to a steam boiler the escaping gases, passing around the superheater, impart heat to the protecting gills which being of cast iron are not effected by corrosion, and are able to perform the double service of preventing the burning out of the tubes and of acting as a storage of heat. This heat is in turn imparted to the steam when the temperature of the gases fluctuates, thereby maintaining a uniform temperature of the steam, and avoiding the necessity of flooding, which is always objectionable. This arrangement also insures the elimination of trouble from undue expansion which causes leaks.

Superheaters can be attached to almost any style of boiler, Fig. 1, representing a protected type superheater attached to a horizontal return tubular boiler. In this instance the superheater is placed at the back end of the boiler as is shown, taking up heat from the escaping gases before they return through the boiler. Fig. 2 shows the protected type superheater attached to a well-known type of water tube boiler, and it will be noted that the location is an ideal one to obtain the results desired. Fig. 3 shows the installation of the protected type superheaters in the boilers of the Americus Railway Light & Power Co., Americus, Ga. and gives an illustration of another method of installing such superheaters. Fig. 4 shows a separately fired superheater, which style may be adopted where exhaust steam is to be superheated; it is an ideal type of superheater where high temperatures are desired. Another feature is that the temperature is absolutly within control, and the operator may increase or decrease the temperature of the steam to any point he may desire.

It might be well to add here a few words regarding the economy for power purposes of superheated steam. Steam, when superheated moderately or to about 500 degrees temperature, will make a net saving in fuel of about ten per cent. This, of course, depends on the type of engine in

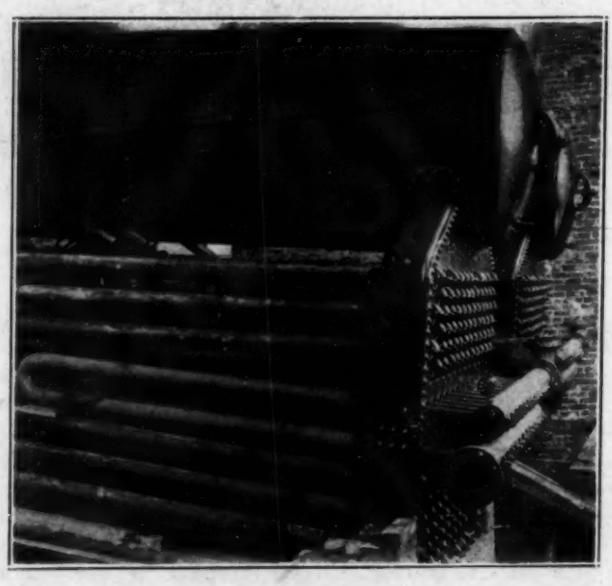

FIG. 3. ANOTHER METHOD OF INSTALLING PROTECTED TYPE SUPERHEATERS.

which it is used; as for instance, the saving will be less on a refined type of engine, such as triple expansion condensing engine than it would on the cheaper type of simple engines or direct acting steam pumps. In the latter case the increase in duty or saving in fuel would reach as high as twenty per cent., where in the former or triple expansion engine only six per cent. is obtained. But with compound condensing Corliss engines a saving of ten per cent. may be obtained.

The operator as well as the engineer who is studying the economical operation of the plant, whether he uses steam for power or whether he uses it for heating and drying, should not overlook the fact that by installing superheaters in this plant, he will do more to cheapen his cost of operation and increase his output with less expense of installation than is probable in any other improvement, and this important item should be thoroughly gone into.

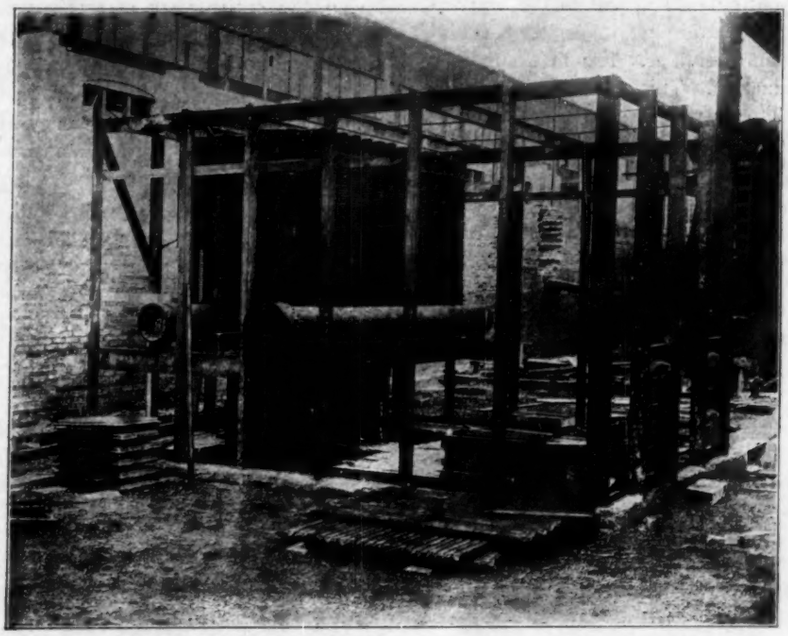

FIG. 4. SEPARATELY FIRED SUPERHEATER, ADAPTED FOR EXHAUST STEAM.

INCREASING THE EARNING CAPACITY OF A PLANT.*

Almost every manufacturing plant can earn more money than it does without straining anything. The net earnings of a mill, like the earnings of a man, depend on the efficiency. Every mill has a certain average efficiency which is governed chiefly by the skill of the individual workers, the kind and condition of the machinery operated, and the layout of the processes, together with many other advantages. This average efficiency is the thermometer of the earning basis.

To increase the earning capacity of a plant, it is first necessary to increase the efficiency of the man. Everything depends on the man. The returns are in proportion to the energy he interprets to it. Machinery is so skilfully made that it is almost human-like in its responses to man's dictates. Eternal vigilance is often said to be the price of success, and in no place can this term be more truly applied than within the walls of a textile manufactory. While every one is supposed to be trying to give the best results all the time, there is not a manager or a supervisor who would say otherwise than that even better results could be accomplished if everything was properly adjusted and every one tried to give better results by increasing the combined efficiency.

The capacity of a man is often problematical, but the capacity of a machine can always be closely figured out. With properly adjusted conditions, and given sufficient authority, a man, as a rule, may show a higher degree of efficiency than when he is, so to speak, hitched in a stall like an ox and only spoken to when driven.

The theoretical capacity of any mill can be easily ascertained under almost any circumstances. The actual earning capacity of some, as operated, is most always below par and disappointing. On the other hand many mills reach admirably high records of efficiency. The true virtue of good mill management is to secure the largest per cent. of the possible production under such economical administration as to give the plant the largest margin of profit, consistent with a reasonably permanent upkeep of the plant. It is false economy and a false profit that is secured by neglecting the upkeep of the plant. It is our duty in managing mills to keep them in good running order for the owners and to provide sufficient sinking fund to maintain the reasonable integral value of the plant at all times. Although paying better dividends for a time the efficiency of a plant is certainly not being increased when lessening its earning capacity by letting the machinery wear out without repairing or replacing same.

The earning capacity of a plant depends upon several other important and distinct measures analyzed as follows:

Convenient location of plant; proper layout of buildings; right kind of machinery; correct arrangement of machinery; uniform engagement of the processes; purchase of good raw material at lowest price available; skilled manufacturing organization; homogeneous service of the entire

*Delivered before the National Association of Cotton Manufacturers.

force; maximum production; minimum account of seconds; minimum waste account; lowest degree of wear and tear; sufficient expenditure to keep machinery in good running order; lowest cost of production, and there must be a good market for the finished product at fair selling prices.

Let any one or more of these measures be improperly laid out and it accordingly impairs the earning capacity of the whole plant. To straighten out any of these matters so as to secure highest efficiency means hard work. We know that good raw material and a good market do not complete the task of managing a plant. This is only the start and finish of the business. From the time that the cotton enters the picker room until it is shipped to the markets, the mill man has under his charge one of the most complicated systems of industrial activities. His first aim is to secure a maximum production. This would be easily accomplished if all he had to do was to start the machinery. But before securing a complete efficiency of the machine, he must increase the efficiency of the help at the machines under his charge. The expert mill man must chisel, paint, play, and reproduce his art mostly through inferior help. Then the expert's most valuable asset is the help he has trained to work his way and to which he clings from year to year. This is the most important stronghold that there is to maintain and increase the efficiency of a mill from day to day. Make help useful and keep them; for they will follow the master mind's wishes and keep everything right very much in accordance to the strength of the mutual relationship and understanding existing between themselves and their superiors. It is not only a full production that is wanted altogether. It must be a full production with everything else relatively right. You know that it is possible to have a full production and have some or all of the following things wrong, viz:—wear and tear account too high; waste account, second account, and cost account, too high.

It must be a full production with every one of these other things right. And in these days of close competition these conditions must be absolutely right, or the management is not getting all that could be earned by the plant. To accomplish all these good things we must begin with the man, make him as comfortable as possible, and train him to increase his efficiency. We must get into very close touch with him, whether he be manager or bobbin boy. The whole idea is to get an automatic response, as it were, and a sympathetic move on the help that works, not only from the top down, but from the bottom up. This sympathetic hustle must work both ways to secure the best results.

Keep all overseers and second-hands interested by showing them how they can do better. Line up the figures and show them some progressive totals to indicate how the waste and the seconds are going down. Inspire them to feel that they believe they can and are going to do still better and they will take much more interest all along their daily tasks, and in turn train their help to do the same. There are thousands of simple ways in which help can be made to feel more interested and comfortable, and for which consideration they will give a much higher efficiency. This starts the maximum production coming along.

Now we must get everything else in line, viz.—low accounts of seconds, waste, costs, wear and tear, and train our help to appreciate the value of helping to do this too. No matter how large a man is nor how much backing he has, he can not accomplish anything without plenty of good help through which to filter his capacity. In these days when plenty of good help is becoming scarcer, we need to study with deep interest their disposition, condition, and capacity with special reference to their individual work. A man succeeds most who makes a great deal of his help and kindly trains them to give a strong homogeneous service.

The writer has no hesitancy in recommending an annual vacation period of from one to two weeks during the month of August for all the help. Those of us who have tried this during the past two or three years, have found that it is highly beneficial, as it gives a much steadier pull during the entire year and raises the average efficiency. Welfare work in all its branches is also giving birth to increased efficiency wherever fostered.

While all is being done that can be done to raise the efficiency of the help, the efficiency of the machinery must not be neglected. There are many ways in which machinery can be coaxed along to give a higher efficiency. A little higher or lower speed may prove beneficial; a little experimenting on one or more machines determines the most economic speed. It is a fact borne out by experience that in many instances reducing the speed of various machines increased the production rather than decreased it. An adjustable speed is another advantage. Run higher or lower speed according to conditions from day to day or from week to week. It sometimes pays to rearrange the entire equipment of a department so that the light is more evenly and better distributed, or so that the traffic of goods before and after being used on the machines is more easily transferred to and from same.

Increasing or diminishing the size of bobbins, spools, chains or beams is a matter which is worth giving careful consideration. In some cases mills have increased the efficiency of a department very much by reducing the size of the spools and vice versa. It is all in the matter of using good judgment in finding exactly the right fit or the exact proportions or relationships that should be established between the help, the machines, and the processes. Widening and lengthening some machines has been very successfully done in some cases to increase the output. Giving a hand additional machinery and running it slower, or giving them less machinery and running it faster is another problem to work out.

Lastly the processes need to be expertly arranged. So closely related are the machines, their operations, and the arrangement of the processes, that one can not be wrong without injuring the combination. Too much processing is as injurious to a high efficiency as is too little processing. Some goods are made better by going through an extra process, while others are made better by dropping one or more processes. Too much or too little draft at various points retards progress. So, starting with the picker room, as the goods pass through the mill from machine to machine, and from process to process, there is a vast chance for a very fine adjustment of the weight of the goods and the draft at each machine; also the matter of regulating the numbers from day to day is a following-up business that must employ the expert's most careful manipulation. The lines are now drawn so closely around the practical manufacturer that, of necessity, he must allow no leaks at any point. The first and last one-half hours of each day; also before and after dinner, are worth as much as any other part of the working time, and yet there are leaks at this time that cut into the profits. Starting and closing the

operations on time must be the invariable rule. Balancing the mill is a good thing. Oftentimes a few extra machines distributed where needed soon pay for themselves.

Automatic trafficking of material, especially empty bobbins, is being finely developed in some mills. Everything that can be more swiftly and conveniently handled without hands is a step forward. The whole idea of this paper is to set the man to asking himself, "What can I do to improve the efficiency of the plant, as it is" and then observe the conditions and see what he can do for himself.

INDIVIDUAL VS. GROUP ELECTRIC DRIVE.

(*Contributed Exclusively to* COTTON.)

BY JOHN W. FOX.

The mill man of to-day is considering two different systems of motor drive, mainly the "group drive" and the "individual drive." The group drive has two different losses; there is the loss due to shaft friction and the loss due to motor inefficiency. By observing the illustration Fig. 1, it will be noticed the spinning room is partially equipped with belts, the balance of the room being operated with motors directly connected.

For the belt-driven frames there is a shaft running the length of the mill between the head ends of the frames; one belt drives two frames, passing from the driving pulley down to one frame then over two idler pulleys and down to the other frame, back to the main driving pulley, thus completing one circuit of a drive for two frames. In such a room the friction load has been known to run as high as 35 per cent., due to the fact that besides the necessary hanger bearings and loose pulleys on the frames, the two idler pulleys are large consumers of power.

By a close examination of the illustration it will be noticed that this shaft is driven by a number of motors. This installation of motors only added about 10 per cent. to the losses of the room. Assuming a 30 per cent. friction load and a 10 per cent. loss in efficiency on the motors, we have a 40 per cent. loss in this room. If it were not for an increase in production which this system gives, the electrification of the cotton mill would find but few supporters, it being argued that the increase of power required is more than compensated for by the consequent increase of production. How much simpler and more efficient is that installation shown in the front part of the cut. Here we have the motor directly attached to the frame, the only losses being that of the motor of say, 15 per cent. The difference between these two installations surely must appeal to the economical mind.

Fig. 2 shows a view in a picker room. One part of this room is driven by shafting, pulleys and counter-shaft from a motor. The picker in the foreground has a motor directly connected to the beater shaft by the means of a Morse silent chain. The cost of this installation is much less than that of the former with belts and shafting, the only loss being that of the motor inefficiency, while the losses in the rest of the room consist of motors, main shaft and counter shaft. The cost of "individual drive" is in this case slightly less than that of the "group drive."

Below is a tabulation of the shafting cost for a spinning frame drive, consisting of a block of 24 frames. The usual method of drive when placing the frames lengthwise in the mill is 12 frames across the mill, counter shafts installed overhead in a "bay" each shaft driving two or four frames as may be decided: such a block of frames usually requires a 100-horse-power motor to drive it. The cost of each counter shaft with hangers, pulleys, belting, etc. is as follows:

GROUP DRIVE.

15 ft. of 2-7/16-inch shafting at 80 cents a ft. less 47 per cent.	$ 6.46
2 ft. of splining for the above	1.00
2 hangers, 12-inch drop at $14.25 each, less 60 per cent.	11.40
4 36-inch pulleys by 6-inch face at $19.20 each, less 60 per cent.	30.72
75 ft. of 3-inch, 2-ply belt at 86 cents a foot net	64.50
34 ft. of 6-inch, 2-ply belt at $1.72 a foot net	58.50
Cost of each counter shaft	$ 172.58
One 100-horse-power motor	$ 900.00
Installing motor at $3.00 per horse-power	300.00
40-ft., 12-inch belt at $2.60 per ft.	104.00
The total cost of the drive, consisting of 6 lines of shaft complete with belting, plus motor and installation	$2,339.00
12 lines of shaft, plus motor and installation, total	$3,380.00

INDIVIDUAL DRIVE.

24 motors 5 horse-power each, with gears, brackets, oil switches, etc. at $85.00 each	$2,100.00
Wiring and installation for the above	400.00
Total	$2,500.00

In one case the cost is in favor of the "individual drive" while in the other it is in favor of the "group drive." The losses of the "group drive" system in a case similar to the above are as follows: Shafting, plus motor, say 25 per cent. for the shafting and 12 per cent. for the motor or a total of 35 per cent. The "individual drive" motor and

FIG. 1. INDIVIDUAL AND GROUP DRIVES IN A SPINNING ROOM.

transformer losses (even though the latter may be necessary) would not exceed 20 per cent., or it would show a saving over the group drive system of 15 per cent. Assuming a flat power rate of $20.00 per horse-power 100

horse-power would cost $2,000.00 per year for power. 15 per cent. of $2,000.00 would equal a 300.00 saving yearly in favor of the individual drive for power alone, over that of the group drive, equal to an investment of $6,000.00 at 5 per cent.

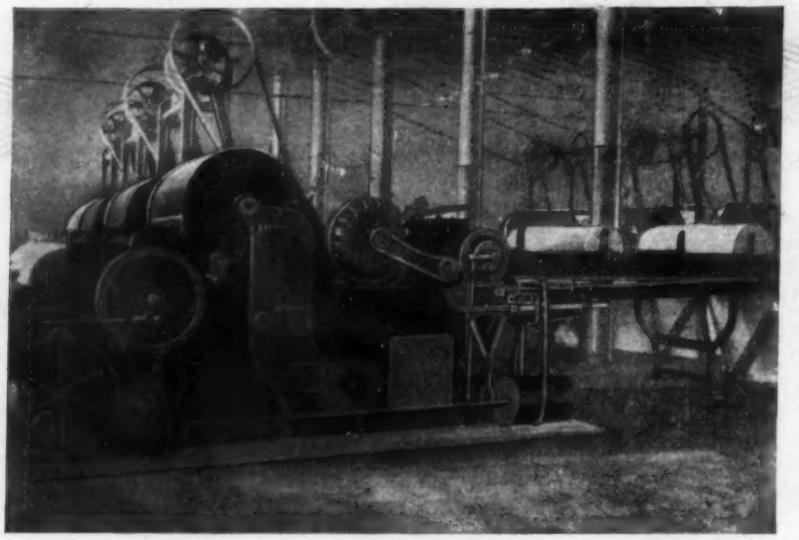

FIG. 2. INDIVIDUAL AND GROUP DRIVES IN A PICKER ROOM.

The above takes note of only the smaller of the benefits of the individual drive. When you stop to consider that the individual drive with its positive R. P. M. not depending on the humidity, the lint and dust of a room, the gradual falling off of efficiency in the belt, etc., all of which are great factors in belt slip; the claims of the advocates for the individual drive system is more than amply borne out in their claim of a 5-per cent. increase in production over and above any system of group drive.

CENTRAL STATIONS VS. ISOLATED PLANTS FOR TEXTILE MILLS.*

BY CHARLES T. MAIN.

The production of power required for textile mills is an incident or detail, and usually the cost of power does not exceed five per cent. of the value of the product. In selecting a location for a new mill, it is important carefully to consider the source and cost of power—and in estimating the value of a mill already existing—but the power is only one item for consideration, and it should not be allowed to play too important a part in the decision.

The chief items of cost entering into the product of a textile mill are usually materials and labor. It is therefore more important to locate in some place where skilled operatives in the particular kind of business to be carried on can be obtained at reasonable wages, and where there can be obtained help who can be trained, and where the cost of transportation of raw materials and finished products is relatively a small amount, than it is to seek a location where cheap power can be obtained but where the other items are lacking. A saving of 10 per cent. in the cost of power would represent a saving of not over one-half of one per cent. in the cost of the product. The relative importance of locating a plant with reference to cheap power increases as the ratio of the cost of power to the value of the product increases.

Most of the earlier mills were located on rivers, and it was due to such water powers as were developed on the Merrimac, Connecticut, Blackstone and other rivers in New England that the manufacturing cities were begun along their banks. Most of these powers within reasonable reach in New England have been outgrown, and now there is found in some of the manufacturing centers a great preponderance of steam power over water power. New centers of manufacturing on tidewater have grown up which have little or no water power, but which can obtain cheap coal and low rates for transportation, and some of the most prosperous mills are driven by steam power.

In recent years the transmission of power by electricity has made it possible to locate the mills more advantageously for construction, light, railroad facilities, etc., and has made valuable water powers which on account of their location were hitherto valueless; and has enabled the construction of central steam plants to be located at the mouth of the mines or at tidewater where cheap fuel can be obtained.

ITEMS IN COST OF POWER.

It can be said generally that the cost of producing power may be divided into two parts:

1. *Independent charges,* or the part which is independent of the output, embracing fixed charges on the plant—as interest, depreciation, insurance, and taxes, and, to a certain extent, repairs.

2. *Proportional charges,* or the part which is proportional to the output, including such charges as coal, labor, supplies, etc.

In general, steam plants may be said to have low independent charges, and high proportional or operating costs. Water-power plants are usually the reverse, with high fixed charge accounts and low operating costs. Another item which should be mentioned as reflecting the cost of power is what Dr. Steinmetz calls the "reliability-factor," which takes into consideration the spare machinery needed to insure continuous service. The charges on this spare equipment are apt to have quite a bearing on the cost of

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power in a central station supplying power for sale, where reliability must be one of the chief considerations, and more spare or duplicate plant is usually maintained than in a private plant.

FACTORS AFFECTING THE COST OF STEAM AND WATER POWER.

The chief conditions which affect the cost of steam power, are as follows:

1. Cost of fuel delivered to the furnaces.
2. Amount of power produced.
3. The load-factor, in its relation to fixed charges, whether the power is continuous and uniform, or intermittent and variable.
4. The net cost of power is reduced considerably in some concerns where the waste heat of the power plant can be used in the manufacturing processes in the form of low-pressure steam or warm water.

The chief conditions which affect the cost of water power are as follows:

1. Fixed charges on the development.
2. Amount of power produced in its relation to fixed charges.
3. The load-factor in its relation to efficiency of wheels, pondage, and reservoir capacity.
4. The cost of supplementary power necessary to make up for the fluctuations of the water power, if required.

VARIATION IN COST OF STEAM POWERS.

Steam power costs the most per unit of power when produced in small amounts. The cost is increased for fluctuating loads, and when used for purposes where the load-factor is small. By load-factor in this instance is meant the average output in per cent. of the full capacity of the plant.

Steam power costs the least per unit of power for comparatively steady continuous loads, as for paper mills and other similar industries; and the cost may be still further reduced where there is use for exhaust steam or other by-products from the plant. Such conditions as the last are found in color textile mills. Power costs the most in plants having a low load-factor with a variable load, and where there is no use for the by-products of the plant, as in a lighting or street railway plant. Textile mills usually run about 10 hours a day, and have comparatively low load-factor, but while the load is on, it is usually fairly steady. Public service plants usually have a load-factor somewhat lower than that in textile mills but the load is variable, which is not so favorable to economical operation as the textile load would be. So far as we know, the net cost of steam power is the least, and the net value of water power also the least, for color textile mills of any of the important industries. This is due to the usually steady load and to the fact that the waste products from the steam plant are valuable for manufacturing purposes to those industries.

The net cost of steam power for textile mills gradually increases from the costs to the mill which can use all of the waste products which will have the lowest cost, to the case of mills making white goods where only exhaust steam for warming the building and drying the yarn in the slashers can be used. In order to give a general idea of the usual costs of power under ordinary conditions in this section of the country, an analysis of the cost of power for a station of 2,000-K.W. capacity is given below. This station is similar to some which have been constructed within the last few years.

As electric drive is becoming so common in textile mills, we will assume for the basis of these costs that the stations considered below will be electric, and of 2,000 K.W. capacity, composed of two 1,000-K.W. units. Usually there is no spare apparatus in these plants. This may be considered as fair average practice at present for textile plants, but would not be tolerated for public service plants where reliability is necessary. In making up the cost of power, all charges have been considered except the interest charges and taxes on the cost of land. These are usually not large items in textile mills, and are variable. The cost of land for the station has also been omitted from the cost per kilowatt of the station. In making up these costs, interest has been taken at five per cent. depreciation and repairs on the apparatus for 10-hour power at 5 per cent. and on the building at 2.5 per cent. insurance and taxes at 1 per cent., making a total of 11 per cent. on the apparatus, and 8.5 per cent. on the building. For 24-hour power, the depreciation and repairs on apparatus is increased 2 per cent. thus making the total charge 13 per cent. instead of 11 per cent. A small amount is added in both cases for incidentals. These rates of depreciation would not be proper for a station where the manufacture of current was the main product as for a public service plant, for newer and more efficient types of apparatus would make it necessary to discard apparatus which was mechanically good. This course would not be so necessary in a manufacturing plant where the saving of a small percentage of the cost of power is not of such vital importance as are some other considerations.

With a steam engine plant, with direct-connected generators, the cost of the plant per kilowatt of capacity is about $125. The cost of power from this station with coal at about $4.25 a long ton, in the pocket, would be about $33 per kilowatt per year of 3,000 hours, as a straight power proposition. This is equivalent to about $24.60 per electrical horse-power per year, and about $21.50 per indicated horse-power per year. This would be a cost of 1.1 cents per kilowatt-hour.

If steam turbines are used instead of steam engines, the cost of the station will be reduced to about $105 per kilowatt capacity. The cost of power produced on steam turbines would also be reduced to about $29.50 per kilowatt-year against $33 for the engine plant. A part of this difference is made up from the reduced cost of the station and apparatus, and a part from the better economy of the turbines which we have assumed are using the superheated steam and high vacuum which is common practice.

If steam power were to be generated for 24 hours a day for 6 days in a week, or say 300 a days a year, as for a paper mill and a few of the textile mills, the cost of power would be about $57.50 per kilowatt per year for the engine plant and about $53 per kilowatt per year for the turbine plant. These costs reduce to ⅝ cent per kilowatt-hour, and ¾ cent per kilowatt-hour, respectively.

The difference in the cost for the two kinds of power is due to the fact that practically the same amount of fixed charges is spread over a much greater number of kilowatt hours. There is also some saving in coal due to the elimination of banking of fires for a large portion of the time. For industrial plants under consideration, the load is nearly constant throughout the operating time, which means good operating conditions.

USE OF WASTE PRODUCTS FROM POWER PLANT.

It has been common practice for many years to use the by-products, such as exhaust steam and warm water, from

the steam plant for manufacturing purposes, and for heating buildings, etc. It has been also very common practice to take steam out of the receiver, between the cylinders of a compound engine, for these purposes. In many mills all of the exhaust of simple non-condensing engines is used for manufacturing purposes. The saving, from using the exhaust of a non-condensing engine which would otherwise go to waste, is large, because there is no additional steam required for the engine, unless the back pressure is increased. Any use of the steam is nearly all clear profit, and if all of it is used the only part left to charge to power is the difference in B.t.u. due to the difference in pressure, and the condensation in the engine cylinder and jackets. There seems to be no good reason why in time the practice of bleeding turbines should not become as common as bleeding engine receivers.

RECEIVER STEAM.

Table I shows the amount of coal chargeable to power when certain percentages of the steam entering the high pressure cylinder are taken out of the receiver. This table takes into consideration the effects on the economy of the engine of not passing all of the steam into the low-pressure cylinder, cylinder condensation, etc. The percentages in the first column are the percentages of the steam passing the high-pressure cylinder which is taken out of the receiver for manufacturing purposes. The second column is the total coal burned and the third is the coal chargeable to power after deducting the coal chargeable to manufacturing.

TABLE I.

Per cent. of exhaust steam used for heating purposes	Pounds of coal per one horse power per hour. All coal charged to power	Net pounds of coal per one horse power per hour after deducting for exhaust steam used
0	1.75	1.75
25	2.06	1.50
50	2.38	1.25
75	2.69	1.00
100	3.00	0.75

If the mill did not obtain its power from steam, so that it could use the low pressure steam of the plant for manufacturing, it would have to maintain a boiler plant of sufficient size to produce an amount of steam equivalent to that bled out of the receiver. The amount of B.t.u. or its equivalent in coal chargeable to power is represented by the amount of work done by the engine, and the losses due to the presence of the engine. The cost of generating the rest of the steam is chargeable to the manufacturing processes.

EXAMPLES OF MANUFACTURING PLANTS.

A few examples of the reduction in cost of power due to the uses of the by-products from the steam engine plant, and the bleeding of steam from the receiver may be of interest.

In one colored cotton and silk mill, the power to run the mill was about 1800 indicated horse-power and for manufacturing purposes about 25 per cent. of the steam for this was required in the form of steam from the receiver. Assuming the cost of power $33 per kilowatt year with no bleeding, the cost chargeable to power with 25 per cent. bled continuously is $29.75. The saving is $3.23 per kilowatt-year. This was for the use of low-pressure steam alone. Probably another material saving could be made by using the overflow from the condenser for water for dyeing purposes.

In another mill where much more dyeing was done, requiring a large quantity of hot water, also a large amount of exhaust steam of manufacturing and heating, the cost of power if no steam and waste products had been used, would have been about $34 per kilowatt-year, but when the proper credits had been allowed for items chargeable to manufacturing purposes, the cost was reduced to about $26 per kilowatt-year, or a reduction of about $8 per kilowatt-year.

In a plain or white goods mill, where no steam would be required for manufacturing, other than warming the building and slashing, the saving to be effected by using receiver steam for those purposes, would be about $2 per kilowatt. About three-fifths of this, or $1.20 is for heating, and the rest for slashing; so about $1.20 per kilowatt is the amount of the reduction which could be made heating the buildings of an industry similar to a textile mill.

There are a few plants run by simple-non-condensing engines exhausting into the dye-house and if the dye-house is running full there is very little change in the boiler room whether the engine is running or not. There is one plant run by a simple non-condensing and a cross-compound engine. The exhaust from the simple engine and the condensing water from the compound engine are all used in the dyeing, finishing, and heating. The net cost of coal for power under the two last conditions is small. In one mill which is run wholly by water power about 12,000 tons of coal are burned annually for dyeing, finishing, and heating the buildings. If a portion, or all of this mill had been run by steam power, the waste products of the steam plant would have furnished a portion of the heat required for manufacturing purposes. The above are fair examples of the requirements in textile mills.

(To be Continued.)

COTTON IN SANTO DOMINGO.

Consul Ralph J. Totten, of Puerto Plata, believes that the island of Haiti, and especially the Santo Domingo Republic, will take an important place in the list of cotton-producing countries. He writes:

The cultivation of cotton is still in the experimental stage in the Dominican Republic. Tree cotton is found growing wild throughout the northern part of the island. It has a rather coarse, short fiber, but is very white. It is gathered by the country people and used for making pillows, mattresses, etc. The serious cultivation of cotton as an expert crop has been attempted only in the Province of Monte Cristi. In the spring of 1907 some of the more progressive merchants and landowners imported a quantity of sea-island cotton seed. Experimental plots were planted with the imported seed, others with the native seed, and still others with both. All were fairly successful, but the results seem to have ben secured from the mixed seed. After the first year a plant was obtained that was larger and hardier than the sea-island cotton, but a much longer staple than the native plant. It is not an annual, but will bear for at least three years with good results. The country people aer becoming interested in the matter, and a constantly increasing acreage is being planted. An up-to-date cotton gin has been installed by merchants of Monte Cristi.

In 1908, 30,000 pounds of clean cotton were exported, while a conservative estimate gave 300,000 pounds for the crop of 1909. For what has already been shipped, they have received 13 cents per pound in the English market, with the assurance that a better price will be paid for the next lot if a fairly large shipment is made.

COTTON MANUFACTURING

COTTON COMBING.

(*Contributed exclusively to* COTTON.)

BY HERBERT C. WOOD.

The combing process is a continuation of the manipulation of the fibers begun in the carding process and its function is to remove the short fibers and deliver the long fibers in a clean and parallel state in the form of a sliver. The strongest and most uniform yarns are those made from a cotton whose staple is long and whose fibers are approximately the same length. Sea Island and Egyptian cottons constitute the two classes of cotton having the longest staples, and Egyptian cotton contains quite a high percentage of short fibers, sometimes running as high as 25 to 30 per cent.

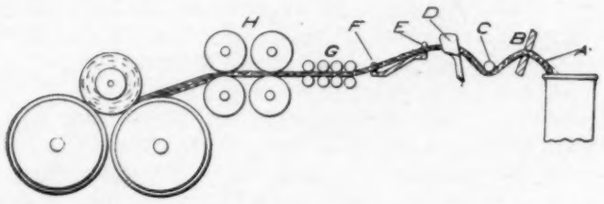


FIG. 1. DIAGRAM OF A SLIVER LAP MACHINE.

Yarns for making sewing thread are required to be even and clean, and for sail yarn they should be very strong. These yarns as well as slack twisted hosiery and yarns of high counts must contain as few short fibers as possible. Thus it is apparent that the process of combing which will remove these short fibers is necessary and of great advantage. Where exceptionally high-grade work is required stock is sometimes combed twice.

In preparing stock for combing there are two methods which can be used: (1) Draw the carded slivers once and then run them through a sliver lap machine, and feed the laps produced on this machine to the comber; and (2) feed the carded slivers directly to the sliver lap machine and double and draw four or six of these sliver laps on a ribbon lap machine which forms a completed lap composed of the four or six ribbons and winds it on to a spool. In the second method the comber is fed with the ribbon laps; the sliver laps to be fed to the ribbon lap machine should be made one and a fourth inches narrower than the required width of the ribbon lap to allow for spreading on the ribbon lap machine.

SLIVER LAP MACHINE.

A diagram of a sliver lap machine is given in Fig. 1, showing the operations performed and the course of the stock through the machine. The sliver A, which has been either taken direct from the card or has been through one process of drawing, is passed through a guide plate B at the back of the machine. Sixteen to twenty ends are usually fed into the machine through the guide plate.

The slivers next pass under a wooden tension roller C and thence through spoons D of the stop motion. The object of the tension roller C is to make the spoon stop motion sensitive. The spoons are so proportioned in weight that the weight and normal drag of each sliver in passing over the spoon would not be sufficient to hold the latter down properly to prevent the machine from stopping unnecessarily. The tension roller is therefore used to give the extra tension required.

The slivers next pass through the guides E and F to the four pairs of drawing rolls G. The guides E and F narrow the width of the sheet of slivers so that it is from 10 to 11½ inches wide as it enters the back pair of drawing rolls. Because of the heavy mass of cotton to be drawn, the several pairs of rolls should be set farther apart on the sliver lap machine than on the drawing frame.

Good settings are as follows: Distance between the front and second rolls should be ¼ inch greater than the length of staple being run.

Between the second and third rolls the distance should be ⅜ inch more than the length of staple being run.

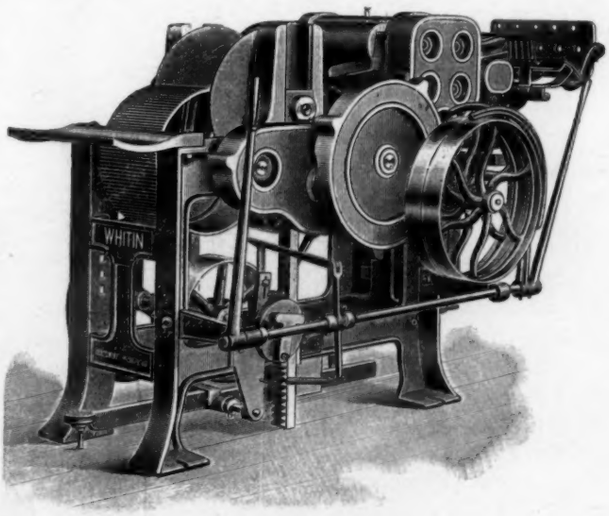
Between the third and back rolls ½ inch greater space than the length of staple being run is required.

The calculated draft on the sliver lap machine occurs entirely in the drawing rolls. It usually varies from 1.75 to 2.50. The action of the rolls is more of a straightening and parallelizing operation than of a drawing nature.

From the drawing rolls the web or lap next passes between two pairs of heavily-weighted press or condensing rolls H which form the lap and deliver it to the calender rolls where it is wound on to a wooden spool.

RIBBON LAP MACHINE.

The finished lap is sometimes fed directly to the comber or it is first taken to the ribbon lap machine where it is again drawn and wound on a spool ready for combing. The ribbon lap machine could be described as a drawing frame which draws laps instead of slivers. On account of the delicacy of the web or ribbon which this machine produces, a large amount of waste is made, which constitutes its greatest drawback.



WHITIN SLIVER LAP MACHINE.

There is no doubt that the ribbon lap machine produces a lap that is more even across the face and in which the slivers have lost their individuality more than in a sliver

lap, and therefore a more even lap is presented to the comber. Ribbon lap machines are now made which double four laps instead of six, thus giving a heavier ribbon for the same weight of lap produced and tending to reduce the amount of waste made. The ribbon lap machine has a draft of from three to six.

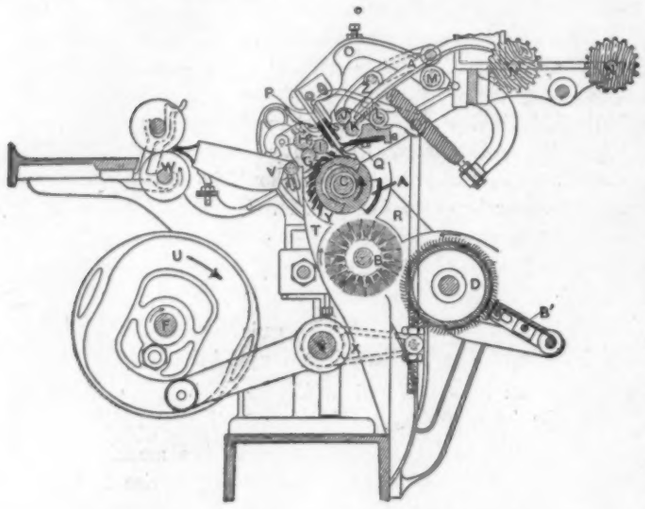


FIG. 4. CROSS SECTION THROUGH THE COMBING MECHANISM.

THE COMBER.

In taking up the subject of combing a modern Whitin high-speed single nip comber will be used as an illustration of the process, methods of setting, etc. This machine as shown in the illustration Fig. 3 is built with eight heads to take laps 12 inches wide and 16 inches in diameter. The delivery from each head is condensed and passes on to a table at the front of the machine, and along on this to a pair of calender rolls and thence to a coiler where the combined sliver is deposited into a can.

The combing process consists of seven successive operations as follows:

1. Feeding the lap.
2. Nipping or holding the portion of the lap fed.
3. Combing the extended tuft with the cylinder comb or half lap.
4. Delivering back a short length of the previously combed stock.
5. Detaching and drawing the fibers through top comb.
6. Attaching or piecing on.
7. Delivering forward the combed stock.

All of these operations occur once during every revolution of the cylinder shaft and follow each other in rapid order, and especially is this true of the last three, which really constitute one continuous operation.

The passage of the cotton through the comber may be best explained by referring to Fig. 4, which is a cross section taken through the combing mechanism. The wound lap from the ribbon lap machine is placed on the fluted rolls NN at the rear of the machine and the lap is passed forward over an inclined polished plate A′ to the feed rolls JK. This pair of rolls has an intermittent revolution which causes the lap to be fed to the nipper S and cushion plate Q, at proper intervals, and a very short length is fed each time. The wooden rolls NN are driven through gearing from the feed roll shaft, and therefore the lap is not subjected to strain from pulling by the feed rolls.

The nipper S is actuated so that when the portion of the lap has been fed it will press against the cushion plate Q and thus hold the cotton securely while the front ends of the fibers are combed by the half lap Y of the cylinder C. After cleaning the front portions of the fibers and taking out all short fibers in this manner, the roller motion consisting of the brass clearing roll H and the steel detaching roll G are revolved backwardly for a partial revolution which return the ends of the fibers previously combed and sent forward. At the same time, the fluted segment A of the cylinder comes under the ends of the newly combed fibers and the leather drawing off roll I comes down on the fibers, so that the latter are gripped and carried forward and overlapped on the ends of the previously combed fibers, thus forming a continuous fleece of combed stock.

As the fibers are carried forward by the drawing off roll I and segment A, the top comb P descends into the rear portions of the fibers and thus this part also receives the cleaning action of the comb. The length of previously combed stock delivered back by the rolls H and G is only about one-half of what went forward, and therefore a continuous fleece is passed on through the triangular shaped pan to the calender rolls W. These rolls deliver the sliver to the front table and with similar slivers from the other seven heads it passes to the draw box and to the coiler can. The short fibers and impurities in the half lap Y are re-

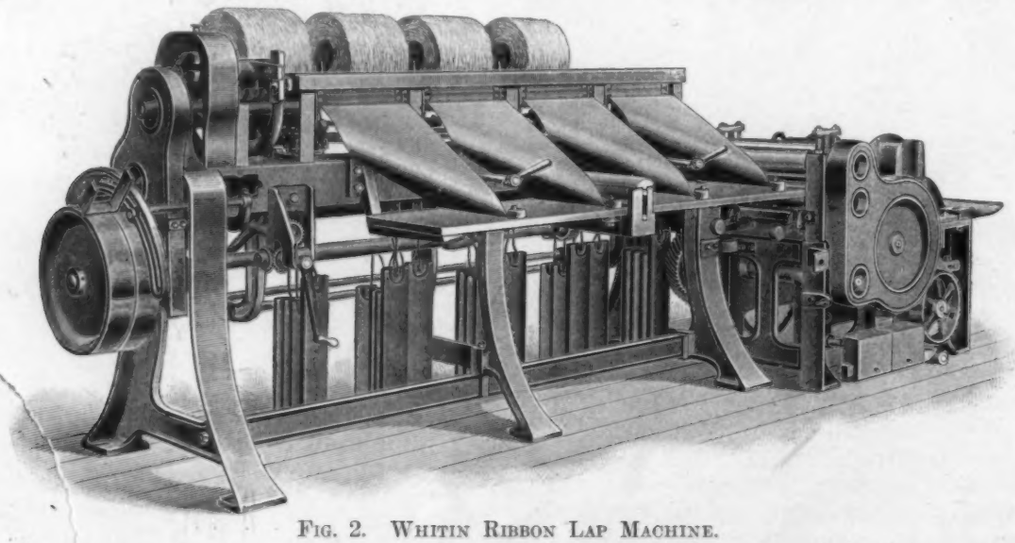


FIG. 2. WHITIN RIBBON LAP MACHINE.

moved by the brush B which is cleared of this waste by the doffer D and from there by the doffer comb or waste packer B'.

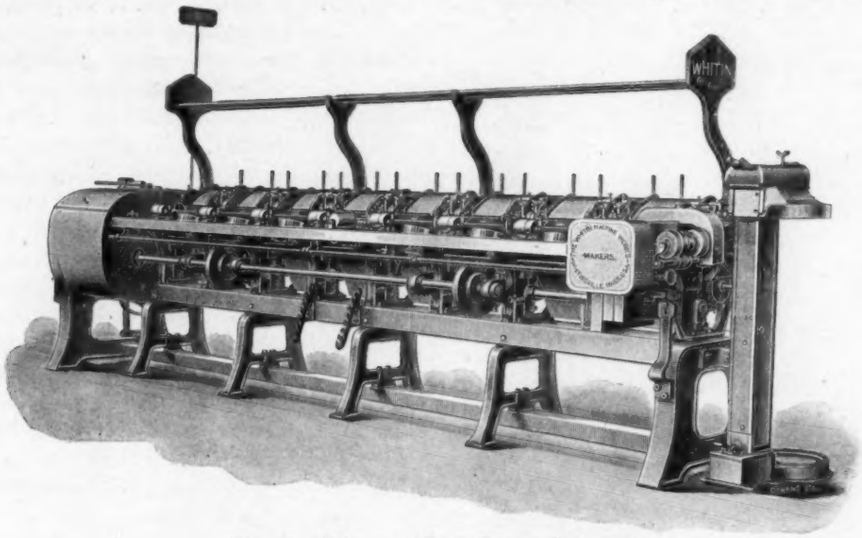


FIG. 3. WHITIN HIGH-SPEED COMBER.

Each operation will now be described in the order in which it occurs, and the mechanism and methods of setting will be explained.

1. FEEDING THE LAP.

As previously mentioned the feed rolls JK are given an intermittent motion by means of a mechanism shown in Fig. 5, being driven from the index gear in the head of the machine by means of a pin A and five pointed star wheel B. The pin is carried in a plate C which is bolted to the index gear, the latter being constantly revolved during the operation of the comber. The plate C is made adjustable by means of a bolt and concentric slot, thus allowing the pin A to enter a notch in the star wheel B at the correct moment to give the feed rolls JK their fraction of a revolution at the proper time to suit the staple being worked.

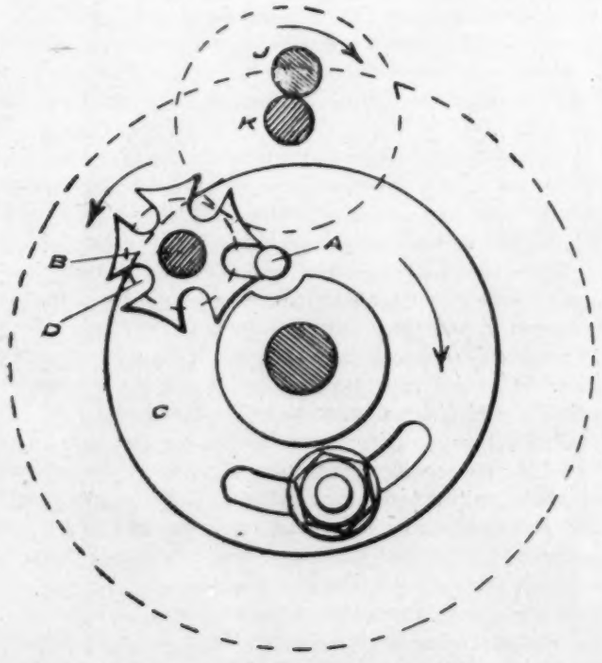


FIG. 5. FEEDING MECHANISM.

The direction of rotation of the feed rolls is always the same.

The draft change gear D is carried on the same stud with the star wheel B, and according as it is larger or smaller, drives the feed rolls faster or slower, and delivering more or less stock. The wooden lap rolls are positively driven from the feed rolls, and are given an intermittent motion similar to that given the feed rolls.

(To be Continued.)

A FEW DON'TS FOR SPINNERS.

Don't use top rolls with too hard or too soft cushions.

Don't have rolls too tight in the cap bars.

Don't set top rolls directly over the center of the steel rolls.

Don't use top rolls with loose covers, or that have been grooved, by hard ends, or that have been flattened by keeping them weighted while the mill has been standing for two or three days.

Don't allow ends of weight levers to rest on the boards.

Don't let traverse guide become clogged with waste and stretch the roving.

Don't use bobbins that are poor fitting or out of balance.

Don't allow spinners to let one end lap upon one boss of the roll.

Don't put in rolls with the lap running the wrong way.

Don't set up rolls out of square with the steel rolls.

Don't allow top rolls to run hard because of lack of oil or accumulations of dirt and cloth, or the bearings of steel rolls to become clogged.

Don't allow too long piecings when creeling.

Don't allow waste to accumulate around the ends of the skewers so as to strain the roving.

Don't use travelers that are worn.

Don't run steel rolls that are loose in the joints or out of true in the bearings.

Don't fail to keep the rings and ring rails level.

Don't use rings with surfaces that have worn away.

Don't run slack bands or bands that are loaded up with lint.

Don't let waste accumulate around the bottom of the spindles.

HISTORY OF WEAVING.

(*Contributed exclusively to* COTTON.)

BY A. E. TUTTLE.

(*Continued from October*, 1909.)

Picking is the second of the three principal motions of a loom and has for its object the throwing or picking of the filling from side to side of the cloth, through the shed of the warp. The even running of the loom, and the quality and amount of production of the cloth, depend to a large extent upon the nature of the pick.

The picking motion is perhaps the most expensive operation connected with the loom. It requires a great deal of power for its operation; an amount which seems excessive when it is considered that the principal thing accomplished is simply that of having added a very small quantity of filling to the cloth. The expense incident to repairs and renewals of worn out parts is also great.

Some of the points to consider in order to secure a good smooth pick are (1) the time to pick, in relation to the timing of the shedding and beating up, and (2) the character of motion given to the pick.

The time that a shuttle should start to pick depends to a great extent upon the type and weight of fabric being woven, and is also influenced by the time of shedding. On looms weaving ordinary plain cotton goods, the proper time to start to pick is when the crank is on the top center.

If the grade of goods to be woven requires an early or late shedding of the harness, the timing of the picking motion should be changed to correspond. A fast running loom will require an earlier pick than one running slowly. When the pick is late, it is sometimes found necessary to add power to the picking motion in order to get the shuttle across the loom in the proper time. This subjects the parts to more wear and tear, and also makes a more jerking movement.

The shuttle should be made to move slowly at first, and then be gradually increased in speed until it leaves the box. It should be free of the shuttle box swell when the full force of the picking motion is delivered. If the shuttle enters the shed too early, or emerges from it too late, the warp yarn in and near the selvages is liable to become chafed or broken.

When too much power is used to drive the shuttle, or if the shuttle is stopped too suddenly in the box, the filling is liable to be thrown off the bobbin, entailing considerable waste of yarn and loss of production. Repeated attempts to save power incident to the picking motion have been made, usually taking the form of releasing the pressure on the shuttle before starting to pick the latter, but they have not been successful to any noticeable degree.

One of the picking motion accessories is the check strap, or shuttle check, used to effect the gradual but rapid stoppage of the shuttle after it enters the receiving box. If it is not adjusted properly, the shuttle is liable to rebound and be left in such a position in the box that it does not receive the full benefit of the picking power on the next pick. Therefore, when driven to the other side of the loom, it does not get far enough into the box. Under such conditions the loom is liable to bang and stop, or the shuttle may get just far enough into the box to raise the stop or protector rod on top of the frog, but not sufficient to clear the frog entirely. This contact of the rod and frog soon wears both to such an extent that the protector motion becomes useless, and if a shuttle should stop in the shed at such a time, a smash would, in all probability, result.

Perhaps the principal trouble on account of rebounding shuttles is, however, in allowing a certain slackness in the filling yarn, which at times forms itself into curls or kinks and thereby makes defective cloth. When the shuttle is stopped too rapidly, the result is the same as from a too powerful pick; the filling is liable to knock off.

BEATING-UP.

The method of beating up the pick to the fell of the cloth is the same in principle on the various types of looms, differing only in slight details in the matter of the relative timing and positions of parts. The beating-up is accomplished by moving the reed, as part of the lay, through crank connections, from its back position to the fell of the cloth. The motion of the lay during weaving is eccentric, that is, the forward motion to the fell of the cloth is faster than the return motion. This is due to the fact that the center of the crank shaft is located below a plane drawn tangent to the normal through the lay in an upright position. In other words, when the lay is against the fell of the cloth, the distance from the race-plate to the floor is greater than the distance between the center of the crank shaft and the floor.

The advantage of this arrangement is that a firm beating up of the filling is obtained on the forward motion of the lay, while the slower outward movement of the lay gives the shuttle a better opportunity of passing through the shed, without requiring an excessively hard pick to drive it across in time.

To increase the power exerted at the beating-up, and also to increase the length of dwell when the lay is in that position, the ears on the swords, are made long and the crank arms short. For heavy goods, requiring a strong blow, the crank shaft is also set low in the loom as compared with the position of the studs in the ears of the swords.

On looms weaving light goods the crank shaft is set only slightly lower than the pins in the ears of the swords. On cotton looms in general, the rocking shaft or swing rail fulcrum is placed in such a position that the swords are vertical when the reed is at the fell of the cloth. This tends to keep the shuttle in its proper position as there is no dip forward.

On single lift Jacquards, where the bottom shed line is stationary, it is sometimes necessary to force the swords some distance beyond the vertical line in order that the yarn will bed properly on the race-plate when in its back position.

When once properly adjusted to position, there is practically no necessity for altering the beating-up motion. It is necessary, however, to see that the crank-arm connections do not have too much play after they have begun to wear. This is to avoid uneven places in the cloth and excessive vibration and jerky movements in the loom.

From time to time loom improvements have been heralded as embodying principles of construction destined to revolutionize the weaving industry. The objects sought to be accomplished are in most cases not new as will be realized by a perusal of Gilroys' and other old books on weaving, generally considered out of date.

IMPORTANT IMPROVEMENTS.

The improvements actually accomplished have brought in their train many subsidiary motions. Among the most

prominent of the radical changes in loom construction may be mentioned the Northrop or Draper filling changing loom, the Harriman shuttle changing loom, the Seaton shuttleless loom, the Perham loom, the Lyall loom and the Millar loom.

Of the above the Northrop and Harriman (Stafford "Ideal") looms are the only types which may be said to have been developed to a commercial success.

The introduction of the Northrop loom immediately stimulated the inventive qualities of loom builders and users all over the country. Automatic filling changing looms were soon placed on the market by other loom builders than the Draper Co., but with little or no success.

Recently the Crompton and Knowles Loom Works have combined the Northrop magazine with certain patented features of their own and have placed on the market automatic looms which appear to have decided advantages over the ordinary types of loom which they are designed to supersede. Among these may be noted the box looms for weaving cotton blankets; fabrics in which colored filling is required only in comparatively small quantities. In this mechanism the ground filling is replenished automatically.

SEATON LOOM.

The Seaton loom was invented in California several years ago, perhaps about 1896, by a Mr. Hunt, and was exhibited in various parts of the country. The last report the writer saw of it was in 1904, when it was mentioned in the trade papers that a Scotch firm of loom builders was building an improved form of it and that a sample loom had recently been in operation at the Bradford (England) Industrial Exhibition.

The principal feature of this loom was the mechanism for inserting the filling. The regular type of shuttle was dispensed with, and so-called carriers substituted. The filling was taken from large spools or cones placed on the floor. The carrier which was driven across the loom by the ordinary picking motion, carried a nipper which held the filling as it was passing through the shed. The loom was adapted for weaving colored check patterns, as various colors could be inserted as desired. Objections were raised to it on the ground that only two, or multiples of two, picks of filling could be inserted, and the cloth woven on it contained an unsightly selvage. Its stated advantages were that it saved filling waste, and caused less strain on the warp yarn because the size of the shed could be made very small.

The Seaton loom was expected to radically change existing methods of weaving, it being claimed that the improvements could be attached to ordinary looms, making them capable of weaving all kinds of materials, and all types of fabrics. However, the loom has failed to do so as yet.

PERHAM LOOM.

The Perham loom was brought to the notice of the public about 1899, by the inventor, Charles F. Perham, Lowell, Mass. This loom dispensed with the lower cam or picking shaft of the ordinary loom, and arranged both shedding and picking mechanisms to actuate from the crank shaft. There were other simple mechanical devices to actuate the let-off, shuttle changing and other auxiliary motions. The principal object was to make a loom as a whole that could be run faster, and one that would require less power and attention than ordinary looms.

The shedding, picking, let-off and shuttle-changing motions were radically different from others on the market. A brief examination of this loom conveyed the impression to the writer that it embodied features that were decided improvements over those on ordinary looms. Considerable interest was for a time taken in the Perham loom in Lowell and vicinity, and an effort was made to secure capital to place it on the market. The foundry and machine shop of the old firm of Whitehead and Atherton were secured and business commenced, but the project was subsequently abandoned and the loom taken off of the market.

LYALL LOOM.

The principal feature of the Lyall loom is a positive motion for carrying the shuttle. The ordinary type of picking motion and picker sticks are dispensed with. If the loom is started while the shuttle is in the shed, there is no trouble on account of a smash, as the shuttle is carried out of the shed before the reed beats up to the fell of the cloth.

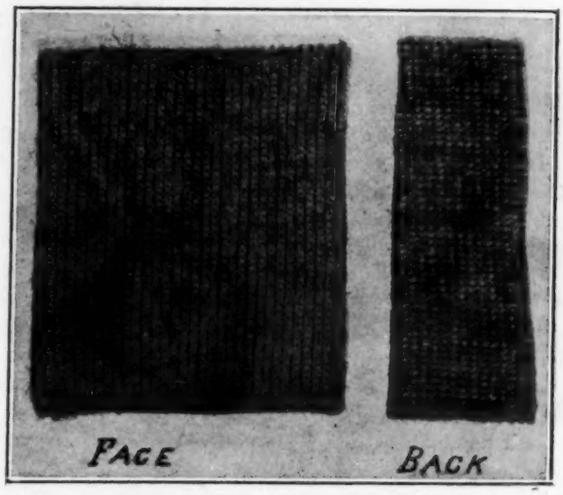


FIG. 12. MILLAR LOOM CLOTH.

The inventor of this loom is also a cotton manufacturer and has some of the looms running in his own establishment, but they have not been adopted by other manufacturers to any noticeable extent.

MILLAR LOOM.

The millar loom was also an American invention, but its introduction received little, if any, notice in the home trade papers. It was taken to England for exhibition purposes, in an endeavor to interest capital. The loom received favorable comment from the textile men there, Prof. Robert Beaumont of the Victoria University (Leeds), being one of the men who became very much interested in it.

The product of this loom, a sample of which is illustrated in Fig. 12, is constructed by a combination of knitting and weaving. The production of the loom was reported to be about three times that of an ordinary loom running the same width and weight of goods. The loom was evidently not a commercial success, probably on account of the limitations of fabric structure, as it is not on the market at the present time.

Circular looms, in which 12 or 18 shuttles revolve in succession in a circle, have been run. As the writer has never seen one, nothing more than this passing reference will be made to them at this time.

(To be Continued.)

PLAIN QUESTIONS AND ANSWERS FOR CARDERS.

BY B. M. P.

Under the above heading, the following list of questions appeared some time ago and I will give my answers to them. There are a great variety of opinions held by different people on the same subject, and many of your readers may have different answers from mine, in which case it would prove interesting to hear from them.

Suppose we are running middling cotton and want to make 20s warp yarn:

1. What is the proper way to mix the cotton?

Answer: The best way to mix the cotton is to use a bale breaker which thoroughly tears apart and opens the bunches of cotton coming from the bales; and feed to the bale breaker from several bales at a time. A thorough mixing and opening of the whole lot are thus obtained.

In the majority of mills, the cotton is opened and mixed by hand, and unless carefully done, very little real opening is secured and consequently not a great deal of mixing.

Open as many bales as your opening room will conveniently hold—the more the better—then open one bale, thoroughly tearing the bunches apart, and spreading the cotton evenly over the floor of the mixing bin or portion of the room, that holds the mixing. Take another bale, open it thoroughly and spread it over the first bales. Repeat the process until you have opened and mixed all of the cotton that the space will hold. The mixing pile will then be composed of layers of cotton from every bale mixed.

When feeding the hoppers from this pile take the cotton out in vertical sections, so that the cotton in the hoppers will have portions from several bales. This will give as thorough a mixing as possible, and leaves no chance for more than a small part of any one bale to be fed into the machines at any one time.

It is best to have two or more large bins built in the opening room to hold five or ten or more, bales each, so that enough cotton can be opened at one time to last several days. Always open your cotton two or three days before it has to be used. This will allow any damp cotton to dry out, and any extra dry cotton to get a chance to absorb moisture from the air of the room. It also gives the fibers a chance to regain their elasticity. By having two or more bins to hold the cotton, one bin may be filled as soon as it is empty, and the cotton can be fed out of the next bin while allowing the cotton just opened to stay in the mixing pile.

2. Should the feeder hopper be kept full, three-fourths or one-half full, and why?

Answer: The hopper should never be allowed to run nearly empty, as the lifting apron will not take up the required amount of cotton, and hence the breaker laps will vary in weight. A good rule to follow is to keep the hoppers from two-thirds full to full, and never allow them to run below one-half full. If this rule is followed, and the cotton is thoroughly opened before being fed to the hoppers, the laps should be nearly even in weight all the time, and there should not be much trouble in keeping the finisher laps up to the standard weight.

3. How do you set the beaters on the breaker, intermediate and finisher lappers?

Answer: The setting of beaters to the feed rolls depends upon the lengths of the staple and the mass of cotton being fed into the machine. When using middling uplands cotton, set the face of the beater blades 3-16 inch from the edge of lower feed roll on the finisher picker. If the laps are heavy, this setting had better be ¼ inch instead of 3-16 inch. The 3-16 inch setting will also work well with the intermediate picker though ¼ inch is used probably more than 3-16 inch for this machine. On the breaker lapper 5-16 inch to ⅜ inch between the beater blades and the bottom feed roll should prove to be satisfactory, though the condition of the cotton at this point as regards openness will have something to do with the distance to set.

4. How do you set the grids on each machine?

Answer: Set the first bar under the feed roll ⅜ inch away from the beater blade, and the last bar about 1 inch away from the beater blade on all machines. This should give good results with the proper adjustment of the fan current, but if the fan current is not properly regulated, there will be too much leaf or waste in the laps, or too much fiber in the waste under the beater grids, regardless of the setting of the beater grids.

5. What weight of lap per yard should you have on each machine?

Answer: The finisher lapper should produce a 12.5 or 13 ounce lap. The weight of the lap depends upon the program of the mill. If 20s yarn is being made from single roving, using two fly frames (slubber and speeder), a light weight lap must be run, or the drafts in the machines will have to be excessive.

If the program calls for 20s yarn from double roving, then three fly frames will be necessary and a 15 or 16-ounce lap can be used and not require excessive drafts. This last arrangement will give best results as regards evenness and strength of the yarn. The laps from the intermediate and breaker lappers should be somewhere near the same in weight as those made on the finisher lapper.

6. Where should the evener belt work on the cone pulleys when the laps are the right weight?

Answer: Set the evener belt so that it will run near the middle of the cones when the lap is of the correct weight. This is almost a universal custom, but some carders prefer to have the belt run nearer the small end of the driven cone than exactly in the middle; but I have never seen the necessity for it.

7. What difference does the draft make on the lapper?

Answer: The draft on a lapper does not have much effect on the finished lap, unless it is excessive, in which case it would tend to make the laps a little uneven in weight. However, this will never give trouble, as a picker very seldom needs to be run with but little variation from the normal average draft of four.

8. Which is the better card to use, a 40-inch or a 45-inch card, taking everything pertaining to a card into consideration?

Answer: The preference is for the 40-inch card rather than the 45-inch card, but there is no real reason why the 45-inch card should not do just as good work. The addition of five inches more to the length of the flats is supposed to cause them to sag in the middle and prevent even setting to the cylinder all the way across the face of the cylinder. This seems to me to be more of a prejudice than anything else. I have used both widths and have gotten my settings on one as well as the other. Where there is no excessive vibration in the mill, and care is taken in the

grinding, a 45-inch card and can be handled and set just as well as a 40-inch card.

9. What is the best draft to have on a card, and what difference does the draft make?

Answer: The general custom in this country is to use about 100 draft on the card, while in English mills on same class of goods, 110 to 125 draft is more common. I have run my drafts as low as 80, and as high as 120, and have not noticed that it made any difference in the quality of the product, other things being the same.

10. Which makes the cleaner carding quick or slow speed?

Answer: The slower the speed of the doffer the cleaner will be the card sliver. This is a self-evident fact because the slower the speed of the doffer, the less the amount of cotton fed through the machine in a given time, and hence the better chance the card will have to clean it.

11. Which makes the stronger yarn, quick or slow carding?

Answer: In my opinion, quick carding will give a stronger yarn. The longer the cotton stays in the card the more chance it has to be injured by the machine.

CARD ROOM QUESTIONS.

EDITOR COTTON:

The following questions occurred to me as being very important to carders, and the answers from different practical mill men will no doubt be instructive. We will consider that middling cotton is used for making 20s warp.

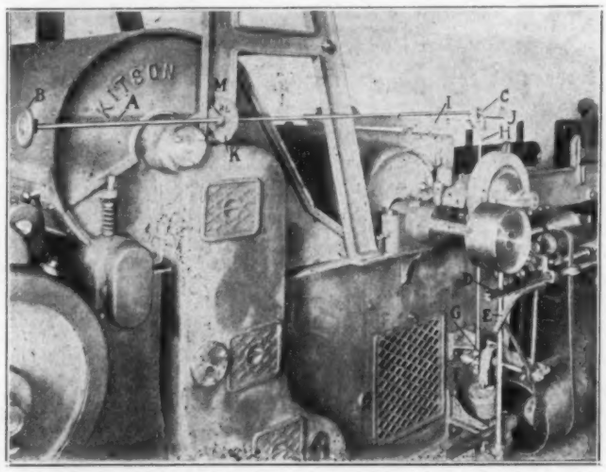
1. If the settings on a card are correct, and the card is ground perfectly, what will cause it to make bad work?
2. How do you set your mote knives and licker-in?
3. What is the best weight to run the card sliver?
4. How many pounds should a card produce in 10 hours?
5. What number of wire should be used on card cylinders, doffers and flats?
6. How often should a card be ground?
7. What advantage is gained by using coarse emery?
8. What advantage is gained by using fine or medium emery?
9. How should the settings on the card be made, and why?
10. Should the wire be burnished after grinding, if so, why?
11. How often should a card be stripped?

SWEDE.

THE BRITTON EVENER REGULATOR.

This device is attached to the evener motion on a picker, the object being to afford a convenient means of making a slight change, standing at the front of the machine, in the position of the belt on the cones which drive the evener. In other words, the mechanism affords an improved method of making this regulation, compared to the previous arrangement on the machine. With the old way, if the lap was coming out too heavy, the adjustment was made by going to the evener behind the beater and feed rolls, and turning a thumb screw on the end of rod H which extended through the arm I.

The new device consists of a horizontal rod A, extending from the front of the picker, where it carries a turning handle B, to the evener motion, having a bevel gear C attached to that end of the rod. The rack D carrying the through the horizontal arm I of the piano motion, and having a bevel gear J secured to the upper end, which meshes with the bevel gear C. Hence by turning the handle evener belt is given a slight backward or forward motion according to the amount of cotton being fed at every moment, through the segment E on the same shaft with a small gear F which is in mesh with a vertical rack G. From the upper end of this rack extends a rod H passing



KITSON PICKER, SHOWING EVENER REGULATOR.

A slightly, the evener belt is moved a short distance by means of the connections explained.

In order to avoid having the operator turn the handle in the wrong direction when an adjustment is to be made, a dial K is provided with the letters H and L which mean respectively "heavy" and "light." A pointer M is secured on the rod A, and when it is desired to make the lap heavier, the handle B is turned to make the pointer register on the "heavy" side, and for a lighter lap, it is turned to register on the "light" side.

As machines are often set closely together in the mill, the device prevents the possibility of accident to the operative and also saves the time required to walk from the lap head to the evener. A new hand was also very liable to make a mistake in trying to regulate the lap by means of the thumb screw.

At the last meetin gof the Fall River, Mass., Physicians' Association, many of the members entered a protest gaainst the practice of "sucking shuttles." It was claimed that disease germs are communicated from one weaver to another through the medium of the shuttles, when weavers draw the filling through the small holes in the shuttle by sucking with the lips. Other physicians say the friction caused by the rapid passage of the shuttle between the threads of the warp while the loom is in motion effectually removes any germs that may have been left on the surface.

THE CONCRETE REVIEW, published by the Association of American Portland Cement Manufacturers, Philadelphia, Pa., in its Vol. 4, No. 4, gives an account of the transactions of the Association of the German Portland Cement Manufacturers, presented to the American manufacturers in New York City on December 15, 1909. The report is very interesting and instructive. A copy of the review will be mailed upon request.

WOOL MANUFACTURING.

FINISHING WOOLEN AND WORSTED GOODS.

TACKING THE CLOTH. FULLING. DESCRIPTION OF A FULLING MILL.

(Contributed exclusively to COTTON.)

BY JOHN F. TIMMERMANN.

(Continued from November, 1909.)

PART II.

Tacking is a process that is resorted to in most places chiefly for the protection of the face of the goods from flocks, and is therefore found in those factories where flocks are used on the goods. Some mills, however, tack those goods which do not receive flocks, for the purpose of protecting the face of the goods from chafing during the fulling process. This is the purpose and reason why "tacking" should be employed in all woolen and worsted mills, for anything which protects the face of a piece of cloth from undue wear and tear can not fail to have a beneficial effect upon the general appearance of the finished cloth. To protect the face, it becomes necessary to double the pieces with the face inward and then to sew the cloth together at the selvages.

In a great many mills this is done by hand, but machines for the purpose are now coming into use more and more. If the work is done by hand it will have to be watched closely in order to have it done thoroughly as it is generally performed by boys; and while as a general rule they are smart enough for such work, they will also develop quite a tendency for mischief, which inevitably results in slighted work. The general practice is to make the stitches about six to eight inches apart; but this is not to be recommended for the reason that these stitches form loops which are apt to catch on projections in the fulling mill and are thus apt to tear out, making the work of tacking practically of no effect. It is much better to take a stitch about every four inches and tie a knot, and there cut the string and proceed in the same manner. When this is done there will be no loops formed to catch, and the work done will be more effective. The chief thing where hand work is used is to be careful about the space between the stitches, but it is also of importance to have those stitches confined to the listing and not have them in the body of the cloth.

MACHINE TACKING.

There is one sure thing about machine work, and that is the stitches are of uniform size and small enough to answer the purpose in every way. There are in general use now two distinct styles of machines, both of which perform the sewing part perfectly, but differ widely in construction. Of the two, the one which in the opinion of the writer performs the work more thoroughly finds the more favor is the Curtis &Marble. This machine first, doubles the cloth and after sewing the lists together, folds the goods in neat piles, so that the operative has simply to wrap the end around the piece, bringing the ticket on top. He then places it in the pile where it belongs. The doubling is accomplished by pulling the piece over a frame which stands about six feet high, said frame having a roll at the top over which the goods are drawn. This roll has a friction attachment so that the cloth may draw hard and thus bring the two edges of the cloth together evenly.

An iron bar runs from below this top roll to a point about 40 inches from this frame and to about the same height from the floor as the sewing machine attachment. The end of the cloth is pulled down and the two sides placed together below the bar and brought forward to a pair of rolls which act as feeders to the sewing machine. The sewing is not started until about a yard or more has been pulled through, and then the edges are brought under the sewing machine and are stitched.

As the cloth passes on, it is brought to another set of rolls, above the folder, which takes the cloth from the sewing machine as fast as it is sewed and folds it off nicely behind the machine. The operator then simply guides the piece in passing, so that the sewing is in the listing only and not in the body of the piece. Right here it will be easily seen that the more careful the menders are when folding the pieces after they are done with them, the easier it will be for the operator to guide them in the sewing machine. This shows at once that when the work is done right and carefully at all points it will make the after processes easier, time will be saved, and better work will result.

The other machine referred to has no doubling and folding attachment, but with a little care and ingenuity may be made to do effective work. This machine is built upon the principle of the sewing machine type usually found in finishing rooms for sewing the ends of pieces together, with the exception that the ring which acts as the feeder is extended into a drum of the width of a doubled piece or about 33 inches. This drum contains pins to keep the cloth in position, and also a guide for the edge of the lists, so that when the lists rub against this guide as the goods are fed to the drum and sewing machine, the sewing is sure to be in the center of the listing. In order to operate this machine to advantage the piece of cloth to be tacked should be laid down in back of the operator in line with the needle bar of the machine, but as far back as space will allow. This will bring the two lists on a line and will save the operator much pulling, in fact, will make it quite easy to double the piece as fast as the machine will sew it.

The only objection is, that the middle of the piece is apt to be in bunches and not as smooth as the other machine delivers it. To overcome this, take a picker stick and fasten it so that it will stand up from a point in line with the needle bar and about the center of the piece. This will take out all wrinkles and will bring the piece to the drum quite smooth. A little attention bestowed upon this will soon show how to place the stick to the best advantage.

FULLING.

After the piece has been sewed, it is rolled up as in the other case and placed in neat piles awaiting its turn for the next step in the process which is the fulling. With this process we enter the field of "wet-finishing" proper, which is the most important work of finishing. Fulling is the laying of the foundation for the finish the goods are to receive, for without the fulling process most finishes could

not be obtained. The peculiar property of the wool fiber makes this process of great benefit to the cloth, for besides the fact that fulling serves as the foundation for the finish, it also adds greatly to the strength of the fabric.

Microscopic examination of the wool fiber reveals the fact that the fiber which is apparently smooth to the naked eye, is not as smooth as it appears, but is covered with a multitude of minute scales. These scales or serrations, as they are called, have the property under certain well defined and known conditions of contracting within themselves, and this peculiarity of the fiber is called its felting property. This felting capacity is called into action by the fulling process. It is well known that wool is not the only fiber which possesses this property, for the fibers obtained from many fur animals, also have it, but wool is the only fiber which has this property and is at the same time capable of being spun into a thread. It is chiefly owing to this latter fact that wool is preeminently the material out of which to manufacture clothing for man.

While the wool fiber is in the process of felting the serrations contract or close and all fibers which are brought in contact with each other will be held by others after they are contracted. This gives a closer adhesion to the various fibers and therefore adds to the strength. The purpose of fulling is primarily to felt together the fibers of which the fabric is composed, but besides that it is made to serve the purpose of obtaining the shrinkage necessary for the finish, and also to loosen all grease and other foreign matter, which the yarn may contain. Thus it will be seen that the fulling process is made to serve several useful purposes.

While the finish ought to regulate the process, it is still very often the case that it has to be conducted without much regard to the finish, but more to regulate the weight of the finished goods than anything else. It is evident from the foregoing that, in order to make fulling a success, the conditions required to call the felting capacity of the fiber into action, must be provided.

The felting capacity of the fiber is called into action by bringing pressure to bear upon the moist fiber, accompanied by a certain amount of heat. But the pressure has to be alternating and not continuous, for if the fiber is subjected to a steady, permanent pressure with both heat and moisture, as under a press for instance, the felting process will be very unsatisfactory. Pressure for the process of fulling is supplied by a machine used for this purpose termed the fulling mill, and shown in Fig. 6. The alternating pres-

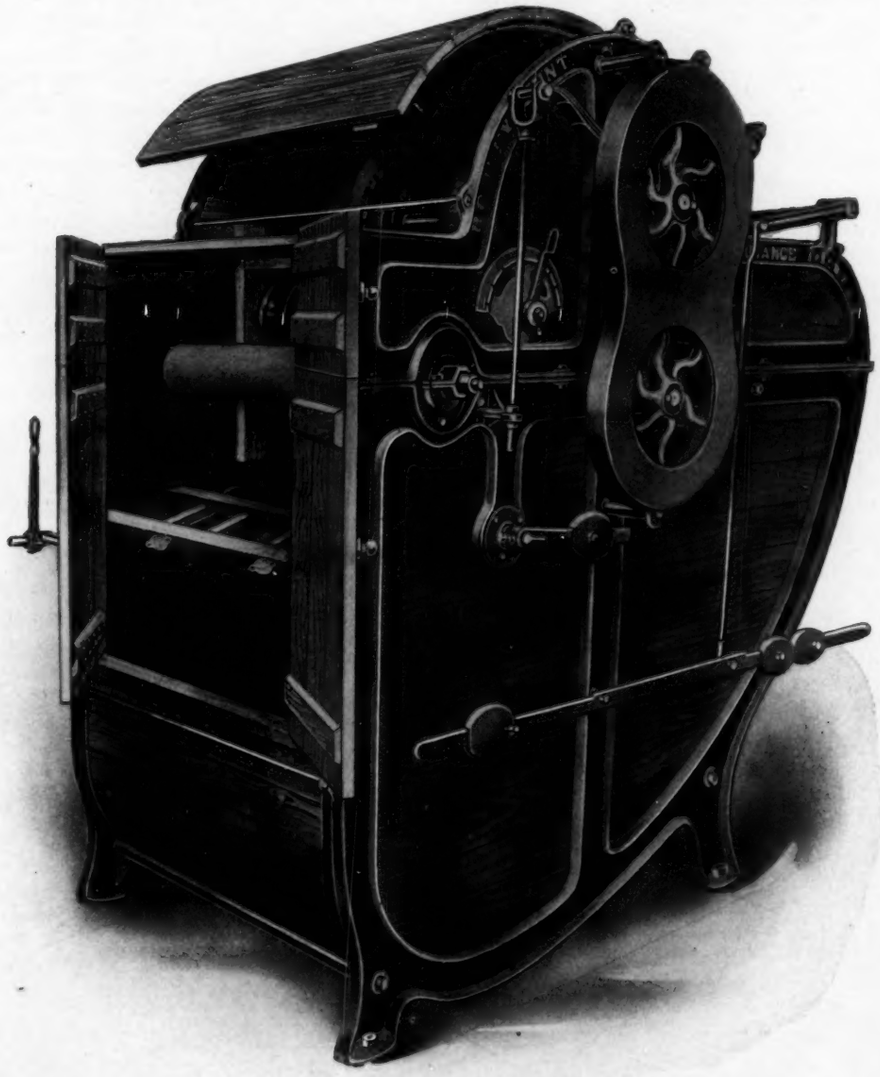


FIG. 6. RODNEY HUNT MACHINE CO.'S ROTARY FULLING MILL.

sure in this machine is produced by means of a set of rolls, through which the cloth passes. The rolls have a face of about eight inches and are 18 inches in diameter.

All machines are not alike in this respect, for they are made in various ways and sizes, but the principle remains the same in all of them. The faces of the rolls are generally of wood or hard rubber, while the rest is of iron or steel. On some machines the lower roll is supplied with brass or bronze flanges and the upper roll runs inside of these. The weight of the top roll is usually found insuffi-

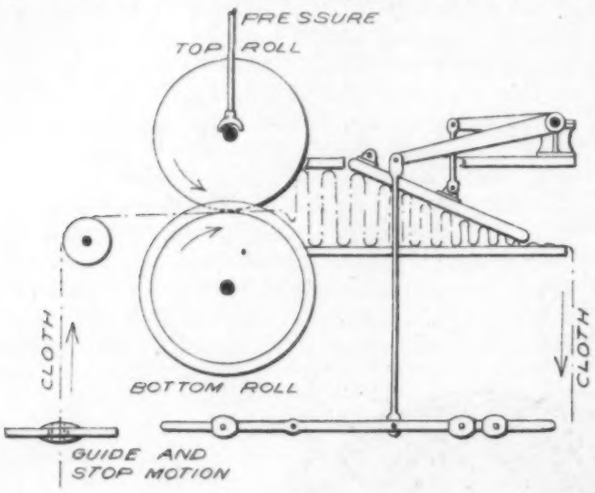


Fig. 7. Diagram of a Fulling Machine, Showing the "Traps."

cient to supply all of the pressure needed, and for this reason elliptic springs bearing on the axles of journals are used to increase the pressure to the amount needed. These springs are placed on the bearings of the top roll on the outside of the machine and from them two rods descend on each side of the mill, passing through lugs in the frame. The lower ends of these rods are threaded and after the rods are passed through the lugs, a nut is placed on each one, and by this means the rods are drawn down and exert additional pressure on the top roll to the extent desired. These springs then will admit of more or less cloth being put through the rolls, and the aim should be to have as much cloth as possible between the rolls, for this will act as a cushion and the pressure exerted will be much more effective.

To keep the cloth running in its proper place, guide rolls and throat plates or rings are supplied at suitable points . One of these which is placed in front of and below the guide roll which is almost on a level with the bottom pressure roll, serves as a stop motion. This is a very important part of a fulling mill and no machine can be called complete without it. This stop motion consists of a frame mounted at the rear part of the machine upon a shaft, so that the front part may be raised or lowered. Guide rings are set in this frame for the cloth to pass through, and it is made sufficiently heavy to require quite an effort to lift it.

The shaft upon which this frame is rigidly mounted, extends to the outside of the mill and is here supplied with an arm which when raised, will release a spring, which in turn will cause the belt to travel from the tight to the loose pulley, or, in case of a friction clutch pulley will release the clutch and thus cause the machine to stop. This attachment comes into action in case the goods get snarled up in the bottom of the mill, which sometimes happens and causes a knot. This knot being too large to pass through the guide ring of course lifts the whole frame, thus causing the outside arm on the shaft to stop the machine.

If this precaution were not taken the goods would stop, but the rolls would keep on turning and in a short while would wear the cloth through and even set it afire. This is usually the only way a thing of that kind is detected where machines without a stop motion are used, for the smell of the burning cloth will tell the attendant that something is wrong. A few accidents of this nature will cost more than the installation of stop motions, but still there are many who do not see its usefulness. With the stop motion in good order, much care is taken from the fuller, for he knows that if anything should go wrong the machine will be stopped.

We have now given a description of how pressure is supplied, but this pressure exerts its influence only in one direction and that is laterally. The goods, therefore, if exposed to this pressure alone would shrink in width only, while the length would suffer. Owing to the strain put on the goods in pulling them through the guides, and from the bottom of the machine, the piece would, in the end come out longer than when it was put in. Therefore, provision has to be made to counteract this tendency and also to exert sufficient pressure to cause the goods to shrink in length. This is accomplished by means of what is termed the traps and is shown in Fig 7. These are set immediately in back of the rolls in such a way that the goods will have to pass through this box-like device before they are allowed to drop to the bottom of the mill. These boxes or traps vary in length in different machines, but for good and efficient work they should not be less than 18 inches in length. In this box is found the means of exerting pressure on the length of the goods, and this is done by means of a cover fitting snugly inside, and being fastened to a shaft on the end of the box nearest the rolls.

Fastened to the cover is a short rod jointed to a horizontal lever which is secured to a shaft also holding a longer lever. Jointed to the end of this lever is a vertical rod extending to another pivoted lever, containing three weights. This arrangement affords a very flexible and powerful packing box pressure applying arrangement. It is possible to actually balance the packing box cover if necessary, or apply whatever pressure may be required. After the pressure is found that gives the desired results on a certain class of woven goods, it is an easy matter to get identical results at any future time by using the same setting.

When no pressure is desired the cover is lifted out of the way by means of the rod and a thumb screw which keeps it in that position. When it is desired to apply the pressure the arm and with it the cover is let down on the goods and the proper weights put on the rod. The goods, after being pushed into the box by the rolls, accumulate until the pressure is sufficient to lift this cover and thus allow the goods to drop again to the bottom of the mill. The amount of weight put on the outside rod is thus used to regulate the pressure, and the goods can be shrunk in length according to requirements. Having thus explained the first element required for fulling we will describe the next element which is the moisture, in the next chapter.

(To be Continued.)

KNITTING

SPRING NEEDLE KNITTING MACHINES.

TROUBLES ENCOUNTERED—THEIR EFFECTS, CAUSES AND REMEDIES.

(*Contributed exclusively to* COTTON.)

BY ERNEST TOMPKINS.

The troubles that occur in knitting are so numerous that but few if any knitters have encountered them all, and even what they have encountered can not completely be kept in mind, since some occur so infrequently that they are forgotten in the meantime. There are some knitters who are so fortunate as to move around enough to get a broad knitting education, but they are likely to get the undesirable reputation for roving—especially undesirable in their particular calling, because frequent changes in the management of the knitting room is costly to the mill. One proprietor who had to change knitters frequently said that every new knitter altered the length of the needle from long to short and short to long until he was heartily sick, so he made it a rule that every future candidate for foreman of the room must agree to use the needles as he found them or consider himself ineligible.

The conservative knitter who does not frequently move, either from objection to being classed as a rover or from a sense of obligation to the mill or to his family, frequently pays for his conscientiousness by missing some of the education which his less scrupulous brother knitter obtains. How, then, is the stay-at-home to get this education? How is he to fortify himself against prospects of a forced resignation when he is required to run a line of work totally unfamiliar to him? These questions may be ridiculed by the experienced and successful knitter well entrenched in his position and in the esteem of his employer. But if he will pause to consider, he can surely recall some days in the past when the work was coming full of holes, and the cutters were telling around how many pounds of waste they were cutting. The proprietor was probably around and asking what was the trouble; and this self-same knitter couldn't tell. If those would speak who could, more than one incident might be related of thousands of dollars being lost owing to knitting troubles which could have been remedied if understood, and even of mills having to go entirely out of business in the same way. Indeed, the mill owners themselves frequently fail to realize that the whole product of the mill is daily placed in the hands of the knitter to do with it as he will. If they did realize this, they would pay a dollar more a day for skill that would divert many dollars a day from the rag man to their own pockets. They would also encourage knitting schools and other means of lifting the art from the plane of "doing as good as we used to do at so-and-so's" to doing better than so-and-so ever dreamed of doing.

But how to help the knitter who can not go to trade schools nor travel for his experience is a difficult question. Although the knitting machine and its operation are receiving more attention than formerly in text-books, trade papers, etc., still the field is so broad that what has yet been written is comparatively insignificant; and of that but little is available for ready reference in case of trouble. To help supply this need the following information regarding the effect, cause and remedy of trouble is submitted. It applies to the American circular loop wheel spring needle knitter, (leaded or trick), on single thread flat work with feeds made up of the following burs: clearing, sinker, lander, presser. It is supposed that neither the yarn nor the stitch are subject to change.

The causes will be numbered and the remedies will be designated R. We will first consider that the fabric is cut, having small holes with single parting of the yarn.

1. Rough or nicked blade or blades in lander or castoff.

R. Polish or replace blades.

2. Sinker bur is too tight or too loose, so that blade binds the yarn against the needle.

R. Readjust or replace sinker.

3. Eyes of needles are too long or too low, so that the yarn cuts in the sinking of the stitch.

R. Shorten the beards or eyes, or use larger sinker.

4. Eyes of needles are too shallow, so that the point of the beard is not covered.

R. Replace needles.

5. Beards are turned to one side or the other.

R. Replace needles or repair the mold.

6. Lander set so tight or so loose that its cuts the stitch against needles.

R. Readjust or replace the lander.

7. Lander blades cutting the stitch against the presser.

R. Readjust the lander or presser, or both.

8. Castoff is so high as to break the stitch.

R. Depress the castoff.

9. Clearing bur cutting the stitch against the leads or cylinder.

R. Elevate clearing bur or move push down ahead.

10. Push down is so far inward that the stitch is pulled tight on the needle and is cut during pushing down.

R. Move the push down out or reduce takeup tension.

Secondly, we will consider that a series of drop stitches is made without a break in the yarn. The causes and remedies are as follows:

1. Yarn dropping down off of the sinker. (This is characterized by a tight thread crossing the hole.)

R. Elevate the guide, put tension on the yarn, or use a blade with a more prominent nib.

2. Yarn at the sinker is running up over the beards. (This is characterized by a loose thread crossing the hole.)

R. Lower the guide, or sinker, or shorten the beard.

3. Yarn dropping out from under the beards between the sinker and the presser. (Characterized same as No. 2.)

R. Cramp the needle beard, use the stationary presser extending from under the sinker to the lander; dampen the yarn.

4. Push down rolling the stitches on the outside of beard. (Characterized same as No. 2.)

R. Move the push down back from the needles, increase the takeup tension or use a wire tension against the cloth ahead of the push down and above it.

Thirdly, we will consider that tears, or long ragged holes or a series of them have been made. This is caused by the lander punching through the cloth, instead of raising the

stitches. The causes of this and the remedies are as follows:

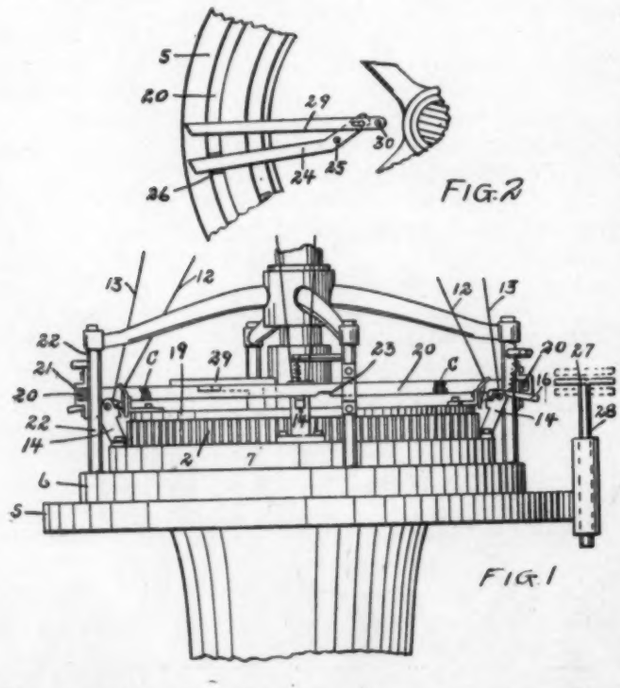
1. Lander is too high.
R. Lower the lander.
2. Lander blades are too blunt.
R. Use a new lander.
3. Takeup is slack.
R. Increase the takeup tension or use a tension wire on the cloth above and behind the push down.
4. Heel of the push down is too low.
R. Elevate the push down.
5. Push down bears on the lander.
R. Move push down forward.
6. Push down bears on the leads or the cylinder.
R. Elevate the push down.
7. Needles are rough or tarnished.
R. Polish by running with a strong yarn and a loose stitch.

(*To be Continued.*)

SPLICING-FEED DEVICE FOR RIB MACHINES.

In making rib stockings for children it is of great advantage to have certain portions of the stocking reinforced, as at the knee and foot. The object of this splice-feed device is to provide means for periodically feeding one or more extra alternate threads to the rib machine, and discontinuing the feed at the proper time. The details of the mechanism and its attachment to the frame are best shown by means of the accompanying illustrations, of which Fig. 1 shows a side elevation of a portion of a latch needle circular rib machine, equipped with the splice-feed device; Fig. 2 is a portion of a plan view of the machine with two actuating levers; and Fig. 3 is an enlarged sectional view of the device, showing its application to the machine.

Referring to the drawings 1 indicates the needle cylinder supporting the vertical latch needles 2; and 3 is the dial



Figs. 1 and 2. Side Elevation of Rib Machine, and Plan View of Two Levers.

supporting the horizontal dial latch needles 4. The needle cylinder 1 and dial 3 are stationary, the cylinder being supported on a base ring 5. Surrounding the cylinder 1 and mounted on the base ring 5 are rotable post rings 6 and cam rings 7 secured together for rotation. The cylinder needle cams 8 are secured on the inside of the rotable ring 7, while the dial needles are operated by cams on the underside of rotable plate 9. The cam plate 9 carries a number of yarn guides 10 located around the periphery of the dial and being one for each "feed." These yarn guides 10 are provided with an eye 11, arranged in close proximity to the upper ends of the cylinder needles when in their upper positions at each feed.

The guide eye 11 is adapted to provide a passage for what may be termed a regular thread 12 and an extra thread 13. The latter yarn passes through a gripping device in the nature of a pair of pinchers, consisting of a base member 14 supported on the revoluble ring 7 and a lever member 16 pivoted in it at 17. The lower gripping face 18 of this gripping device is arranged somewhat above the plane of the yarn eye 11, as shown particularly in Fig. 3. For closing the grip by operating the movable lever member 16 to a closed position, there is provided a spring 19. For opening the grip or rather the several grips arranged around the circle of the machine, there is provided a shiftable ring 20 mounted in bearings or keepers 21 supported on the posts 22 and having notches or recesses as 23 with an inclined end serving as a cam to ride down the outwardly projecting end of the grip member 16. The ring 20 is shown cut away at C,C. For shifting the position of the ring 20, it is provided with a lever 24 (see Fig. 2) pivoted at 25 to the cam plate 9, and adjacent to its projecting swinging end coupled to the ring 20 at 26.

The projecting end of the lever 26 is adapted to strike and be operated by the tripper 27, consisting of a rotary disk mounted on a vertically movable spindle 28, and the movements of which tripper are controlled by a pattern chain. In addition to the lever 24 there is also provided a lever 29 pivoted to the cam disk 9 at 30 and coupled to the rear extension of the lever 24 and projecting in a plane close to the plane of the lever 24. The tripper 27 is adapted to be shifted in three positions, as shown in Fig. 1. In one position it will strike the lever 24 and shift the ring 20 in one direction, in another position it will strike the lever 29 and shift the ring 20 in the opposite direction, and still in the third position, it will fail to strike either the levers 24 and 29.

It is obvious that when the ring 20 is shifted to allow the grip member 16 to enter the notch 23, that the grip will be closed by the spring 19 and the thread 13 tightly gripped. When this is done with the machine in operation, the yarn 13 will be broken adjacent to a point where the needles begin to operate on the yarn and the end of 13 will be left and held trailing in the needles. When the gripping device is opened, the yarn 13 will begin to feed promptly and certainly on account of the friction of the trailing end in the needles and the friction with the regular yarn 12 in case one is running in at the same guide or feed. By providing the gripping device in close proximity to the needles, the withdrawal of the broken or trailing end from its trailing position in the needles, on account of relaxing the strain on the yarn at the time it is broken, is obviated.

In the operation of the device the yarn will be broken, as the cam cylinder revolves, at the point at which the yarn

engages the needles, owing to the fact that at such point there will be a doubled portion or bite in the yarn at the last needle engaging the same when the breaking strain arrives; so that the yarns will be broken at the needles in such a manner as to leave, in each case of a broken yarn, a trailing end which will facilitate the taking up of the yarn by the needles when the yarn grip is released. A number of threads at various feeds around the periphery of the machine may be simultaneously discontinued or simultaneously introduced into the regular knitting without trouble from defects in the fabric at the points where the threads are either discontinued or again started.

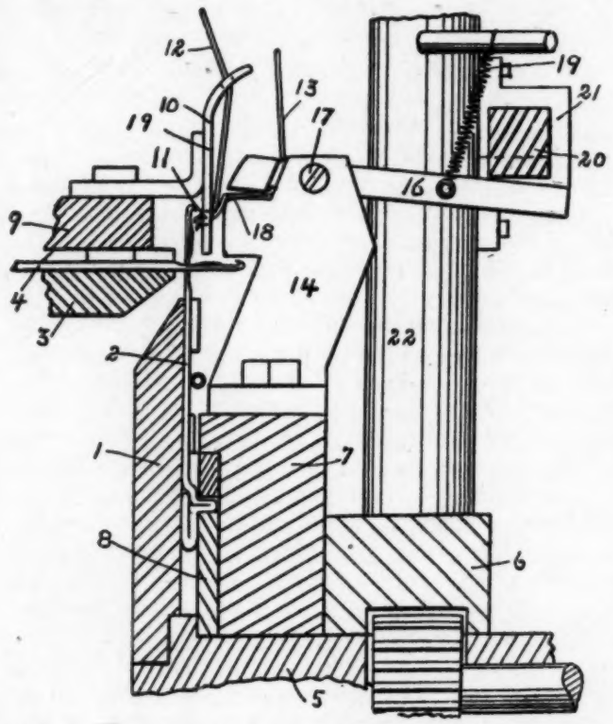


FIG. 3. SECTIONAL VIEW OF THE SPLICE-FEED DEVICE.

AN OPEN STRIPE HOSIERY MACHINE.

The object of this knitting machine is to produce a regular stocking having open stripes running lengthwise of the stocking, and being at certain distances apart. A further object is to provide means for continuing the stripes at the front part of the stocking into the foot, while the stripes at the rear of the stocking are stopped at the foot. The machines consist of a regular circular hosiery machine, embodying the proper mechanisms for producing the stripes. The detailed description will now be given by referring to the following illustrations: Fig. 1 is a plan view of a portion of circular knitting machine; Fig. 2 is a diagram of the knitted fabric produced; and Fig. 3, is a diagramatic view illustrating a development of the interior of the cam cylinder and the positions of the parts during the knitting of the foot portion of the stocking. Referring to the illustrations:

1 designates the bed plate, supporting the needle cylinder 2, and the cam cylinder 3. The cam cylinder 3 has its bearings in the bed plate and is provided with bevel teeth with which mesh the teeth of a bevel gear wheel affixed to the driving shaft of the machine. The cam cylinder 3 as shown in Fig. 3 is provided with cams which include the oppositely disposed stitch cams 4 and 5 and the adjacent raising cams 6 and 7, leading to the supporting ledge or flat portion 8. The cam cylinder 3 is also provided with picker devices 9 by means of which certain needles are successively moved into and out of action during the reciprocations of the cam cylinder in knitting the heel and toe portions of a stocking.

In order to produce the stripe effect, three sets of needles 10, 11, and 12 are employed, which are alike in every respect except that their latches 13 are of different lengths, the lengths of the latches of the needles 12 being shortest, those of needles 11 being next, and those of 10 being longest. These needles are arranged in the relation indicated in Fig. 3, that is, the needles 10 are arranged at intervals around the entire needle cylinder; the needles 11 are arranged at intervals around one-half of the cylinder that is used for knitting the front part of the foot at the proper time, and the needles 12 are arranged at intervals around the other half of the cylinder for knitting the bottom part.

Arranged in the cam cylinder 3 adjacent to the cams mentioned is a lowering cam 14 and a raising cam 15, which are adapted to actuate the needles in conjunction with stitch cam 11 in the formation of the leg and foot portions of a stocking. The cam 14 is mounted on a stem 16 which projects through a boss 17 on the cam cylinder and is held normally inward, as shown, by the action of a spring inside of the boss 17. The outer end of the stem 16 is pro-

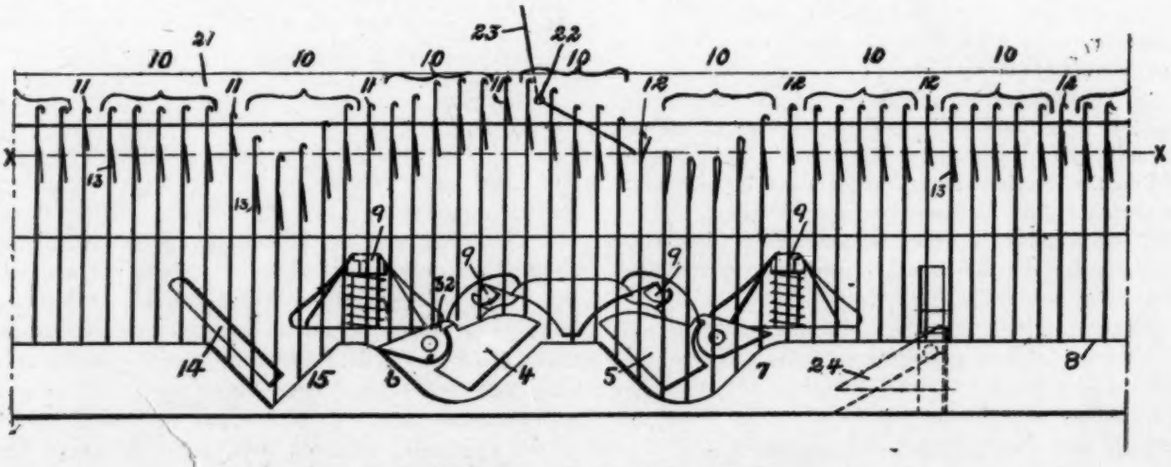


FIG. 3. DEVELOPMENT OF THE CAM CYLINDER.

vided with a collar 18 in which is formed a V-shaped socket 19 which registers with a V-shaped projection 20 on the boss. By turning the collar 18 so that the socket 19 escapes the projection 20, the cam 14 is withdrawn toward the outer perimeter of the machine, and thus moved out of action, to permit the cam cylinder 3 to be reciprocated during the formation of the heel and toe parts of the stocking. The cam cylinder is provided with ring or latch guard 21 containing an eye 22, adjacent to the cams 4 and 5 whereby thread 23 is directed to the needles.

Mounted in the cam cylinder 3 is an elevating cam 24 which is movable above and below the ledge 8. This cam

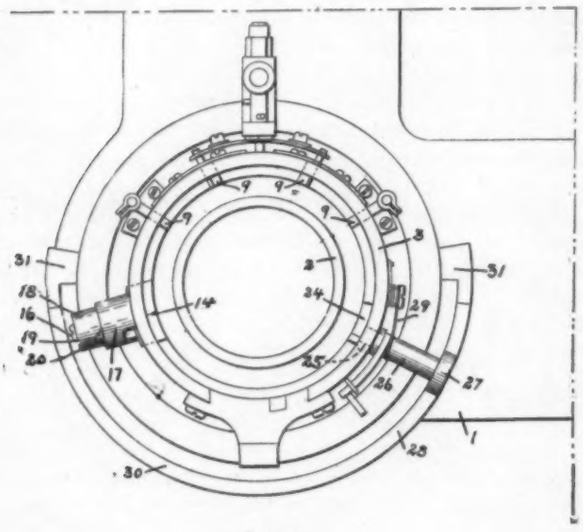


FIG. 1

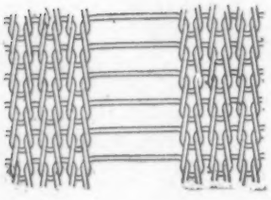


FIG. 2.

Figs. 1 and 2. Plan View of the Knitting Machine and Diagram of the Knitted Fabric.

24 is formed on or secured to a block, which is slidingly fitted to a vertical slot 25 in the wall of the cam cylinder 3. Projecting outwardly from the block is a stud 26 (See Fig. 1), which is provided on its free end with an anti-friction roller 27 adapted to be acted upon by a cam 28, which thereby moves the cam 24 above the ledge 8, for a purpose that will be described later. The cam 24 is maintained normally, depressed by the action of a suitable spring 29 arranged on the exterior of the cam cylinder 3 and bearing upon the stud 26. The cam 28 is mounted on the bed plate 1, and comprises a segmental bar having a horizontal portion 30, whereby the roller 27 is guided to and from the horizontal portion 30.

In order that the cam 28 may be raised into the path of the roller 27 or lowered therefrom, the cam is supported by screws projecting from the bed plate 1 and passing through oblique slots in the cam 28 the latter being provided with a pin which is adapted to register with a socket in the bed plate, and thereby lock said cam in the raised position. The pin projects outwardly and may be readily operated by hand and the cam 28 raised or lowered as desired.

In Fig 3, the top of the web, or the plane where the loops are formed is indicated by the dotted line x—x.

Assuming that thread 23 is being delivered to the needles through the eye 22, the operation of the machine is as follows:—During the knitting of the leg portion of a stocking the cam 28 occupies its raised position. When the said cam occupies this position, the cam 24 is raised and lowered during each revolution of the cam cylinder 3 and maintained elevated during one-half of each revolution. As the cam 28 extends around that half of the needle cylinder occupied by the needles 12 the cam 24 is maintained elevated during its passage by said needles. As the stitch cam 5 passes the needles, the latter are drawn down to engage and act upon the thread 23. The elevating cam 7 raises the needles to the ledge 8. At this point the latches of the needles 11 are raised sufficiently high to free said latches from the loops of thread just formed. The needles 12 in one-half of the cylinder are next acted upon by cam 24 which raises the nedles slightly higher than cam 7 and causes the latches of needles 12 to escape their loops, the latches of the needles 10 still remaining in their loops. The needles are next operated by cam 14. At this point the needles are drawn down below the plane x—x, and the latches of the needles 11 and 12 being free, close over the hooks of the needles and thereby cause the latter to cast off their loops of thread; and the needles 10, having their latches engaged by their loops, merely draw down and retain said loops for a succeeding course of stitches. As the cam cylinder 3 advances, the needles 10 are raised by the cam 32 sufficiently to cause the latches of the needles to escape their loops. The cam 5 now meets the needles again and draws down the latter to engage and act upon the thread 23, the needles 10 knitting the thread into the fabric in the regular manner; and the needles 11 and 12 being clear of their loops, draw down the thread without knitting. Thus it will be seen that the needles 11 and 12 do not knit the thread, but merely draw out sufficient thread to form a connection between the rows of stitches, thereby producing longitudinal open stripes through the fabric, at each point where the needles 11 and 12 occur, the needles 10 knitting successive rows of stitches at right angles to and intersected by the longitudinal open stripes. After the completion of the leg portion of the stocking, the cam 14 is moved out of action and the cam cylinder 3 is reciprocated to knit the heel, the needles being thrown into and out of action for this purpose by the picker devices 9.

In order to continue the open stripes along the top of the foot portion of the stocking and omit said stripes from the bottom, the cam 28 is lowered to its bottom position, just prior to commencing the knitting of the heel. When the said cam occupies this position, the cam 24 remains below the ledge 8 and the needles 12 being arranged in that half of the cylinder employed in knitting the bottom of the foot of the stocking, and being unaffected by the cam 24 retain their loops and knit the thread into the fabric similarly to the needles 10. As the needles 11 arranged in the other half of the cylinder, are raised by cam 7 sufficiently to clear their latches of their loops of thread, they, of course, knit the open stripes in the fabric along the top of the foot portion of the stocking, as previously explained.

DYEING, BLEACHING AND FINISHING

DYEING COTTON PIECE GOODS.

METHODS FOR DIFFERENT FABRICS. JIGGER DYEING. PADDING MACHINES. CONTINUOUS MACHINE. DIAZOTIZING AND DEVELOPING MACHINE.

(Contributed exclusively to COTTON.)

BY H. R. CARTER.

PART 2.

The way in which cotton piece goods are prepared before dyeing depends entirely on the character of the goods and the purpose for which they are intended to be used. Usually the first operation is singeing, which is followed by boiling in alkaline liquors. The size is thus removed from the cloth, together with many impurities and motes which would otherwise unfavorably influence the appearance of the finished goods.

When pale and very brilliant shades are desired, the goods are usually bleached after having been boiled off.

Cotton sateens and similar cloths are prepared for dyeing by boiling in a crabbing machine and subsequently steamed on perforated cylinders.

Cheap linings intended for black are frequently not boiled off at all, but dyed in the grey state after singeing.

Cotton piece goods may be directly dyed with Diamine colors in various machines, such as an open vessel, a jigger, a padding machine, a padding machine with simultaneous finishing, or a continuous machine.

Crepons, heavy qualities of velveteens and other closely woven and broad fabrics, which cannot be dyed in the jigger, are most frequently dyed in an open vessel. Velveteens are dyed in machines specially constructed with openers and appliances for cutting. The quantity of water to be used in dyeing should be about 20 to 30 times the weight of the goods to be dyed. The goods are allowed to run about one hour at the boil and another one-fourth hour with the steam shut off.

The dye baths may be made up as follows:

(1) For light shades.—

Soda ash	1 per cent.
Soap	1½ per cent.
Sodium phosphate, or Glauber's salt	4 per cent.

(2) For medium shades.—

Soda ash	2 per cent.
Glauber's salt	10 per cent.

(3) For dark shades.—

Soda ash	2 per cent.
Glauber's salt	20 per cent.

The soap used for light shades may be replaced by turkey red oil. Glauber's salt in most cases may be replaced by common salt, of which, however, 50 per cent. more has to be used, that is, 30 per cent. of common salt instead of 20 per cent. of Glauber's salt is required for dark shades.

The additions to the dye bath are best made in the following order: First, the alkali, then the color solution, and finally the Glauber's salt or common salt. In the case of shades of uneven dyeing tendency, the salt may be added in two or three portions after the dyeing has been progrssing for some time.

JIGGER DYEING.

The jigger is the machine most extensively employed for dyeing cotton piece goods. It has an advantage by making it possible to dye expeditiously and easily with a small volume of dye liquor. According to the weight of the goods, dyeing on the jigger requires from three-fourths to one and a half hours, the goods running at an average speed of about 45 yards per minute. A quicker movement than 60 yards per minute is not advisable, especially when handling large rolls.

Under normal conditions, the quantity of liquor amounts to twice the weight of the goods to be dyed, but may be even less for large rolls. Soda and salt are added, according to the depth of the shade to be dyed and according to the volume of liquor employed, in the following proportions:

For light shades, 3 ounces soda ash and 5 to 8 ounces of crystallized Glauber's salt per 10 gallons of liquor.

For medium shades, 3 ounces of soda ash and 8 to 16 ounces of Glauber's salt per 10 gallons of liquor.

For dark shades, 3 ounces of soda ash and 24 to 32 ounces of Glauber's salt per 10 gallons of liquor.

For light shades the liquor should be as dilute as possible. Dyeing is commenced at 120 degrees F. with soda and the dyestuff in the dye-bath. After four passages of the cloth, the Glauber's salt is added, divided for the two ends of the machine, and two to four passages more are given at about 175 degrees F.

Very light tints are dyed without any Glauber's salt. Soda and from 1½ to 3 ounces of turkey red oil per 10 gallons of liquor are used instead. The soda is frequently replaced by phosphate of soda by adding 5 ounces per 10 gallons of liquor.

For medium and dark shades the bath is first boiled up with the soda. One-half of the coloring matter is added in solution and the material entered. After the first passage the remainder of the color solution is added and the cloth is given three more passages. Finally the Glauber's salt is added in two portions and the dyeing finished in four to six more passages with the bath at the simmer.

If the desired shade is not attained, a dilute solution of the requisite dyestuff is added.

For dyeing goods which are not easily penetrated, a little more soda is used and in some cases, particularly for darker colors, 1½ to 3 ounces of turkey red oil per 10 gallons of liquor are also added. The repeated and prolonged use of a standing bath can only be recommended for dark shades and only as long as the liquor has not become turbid by the dissolved size and other impurities.

For replenishing the standing bath, the following approximate additions are made: 1-4 quantity of soda ash, 2-3 to 3-4 quantity of dyestuff and 1-4 quantity of Glauber's salt of that used for the first bath. For controlling the strength of salt in the dye liquor, the hydrometer is used. The bath should stand at about 6 to 7 degrees Twaddel at a temperature of 60 degrees F. for dark shades.

Fig. 1 is a diagram of a jigger and a rinsing tub. The jigger, is used for dyeing a rinsing A. and rinsing tub B. is used for rinsing the cloth after dyeing.

The jigger consists chiefly of a tank which holds the dye liquor, and contains three rollers C, C′ and C″ which keep the cloth immersed in the dye liquor. Situated on top of the tank are two rollers D and E, which are driven by frictional contact with other rollers and their rotations are reversible by means of a lever.

The cloth to be dyed is first smoothly wound upon the roller D and then the machine is laced up, by carrying the cloth under the roller C, up over the roller C′; then under the roller C″ and finally up to the roller E, around which it is wound, when the machine is started. When the cloth has passed through the dye liquor and been wound on to the roller E, the rotation of the rollers D and E is reversed and the cloth is sent back again through the dye liquor, and

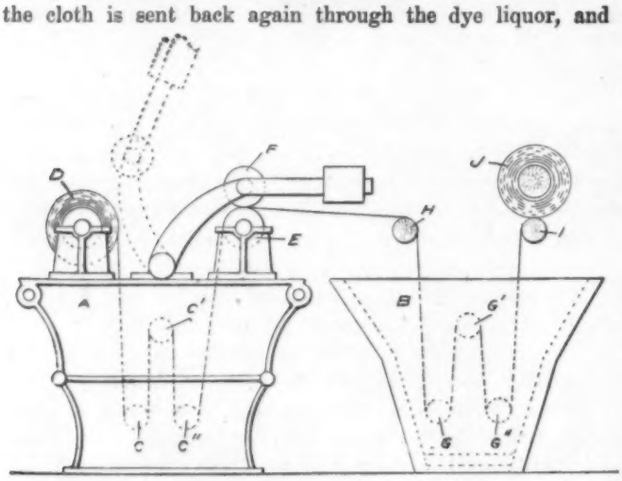


FIG. 1. DIAGRAM OF A JIGGER AND RINSER.

wound on to the roller D. In this manner, sufficient runs are made to dye the cloth properly. During the dyeing process, the squeezing roller F is lifted out of action into the position shown by the dotted lines. For the last passage, however, the squeezing roller F is put into action and the goods are passed between the rollers E and F and into the rinsing bath B without being batched.

The rinsing bath consists principally of a tank, containing three guide rollers G, G′, G″, a guide roller H, and a winding roller I on which rests the cloth roller J.

The cloth passes from the jigger, as indicated by dotted lines, and is wound on to the roller J.

PADDING MACHINE.

The padding machine is chiefly used for pale and medium shades. Padding machines with either two or three rollers are employed; those with three rollers giving the same effect as those with two but with fewer passages. The trough of the padding machine is preferably made of wood. In machines with two rollers, it holds from 12 to 15 gallons, while the capacity of the trough of a three-roller machine is nearly 25 gallons. The bath is heated either by an open or a closed steam pipe and is prepared for pale shades with the requisite quantity of coloring matter and three ounces of soda ash and 5 to 8 ounces of Glauber's salt per 10 gallons of liquor. After half the requisite color solution and soda have been added, the bath is heated to about 115 degrees F. and one passage is given. The rest of the color solution is then added with sufficient water to bring the liquor up to its original height for the second passage. The temperature is then raised to about 140 degrees F., the Glauber's salt added and after two more passages, a swatch taken off for matching.

For medium shades, the quantity of soda ash is diminished to 1½ ounces and that of Glauber's salt increased to 15 ounces per 10 gallons of liquor. The temperature is raised to 175 degrees F., and the dye-baths are rarely used a second time. Dyeing in the padding machine with simultaneous finishing is chiefly used for pale shades and for padding cotton prints. The coloring matter which is dissolved in condensed water, is added to the hot finishing paste, the dyeing and finishing operations being thus combined.

CONTINUOUS MACHINE.

Dyeing in the continuous machine is most satisfactory when it is required to turn out large quantities of cloth in dark blue and black shades. Cheap, plain cambric linenettes and similar linings are frequently dyed black in one passage in the continuous machine. The machine, as shown in Fig. 2, which is a cross sectional view, consists of four compartments, A, B, B′ and B″. The compartment A, which is used for the caustic soda bath, is separated from B by a solid partition C, whereas the compartments B, B′ and B″,

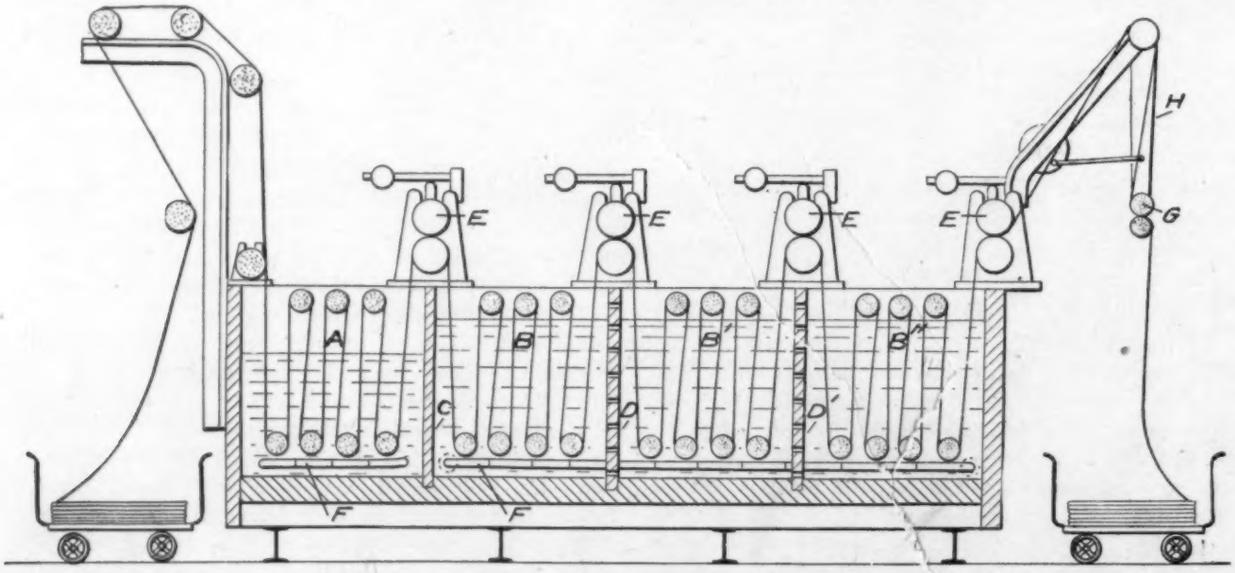


FIG. 2. DIAGRAM OF A CONTINUOUS MACHINE.

which are used for the dye baths, are separated from each other by perforated partitions D and D'. Located above each of the partitions are sets of squeeze rollers E. The bottom rollers are metal, and the top rollers are metal, covered with rubber.

Each compartment is provided with a set of immersion rollers as shown in the illustration.

The liquors are heated by means of closed steam coil F, located at the bottom of the compartments.

In the operation of the machine, the grey goods are first boiled in the compartment A, which is charged with 3½ pounds of soda ash. The bath is freshened up during the passage with ½ per cent. of soda ash figured on the weight of the dry cloth. This bath rapidly turns brown and dirty, owing to dissolved size and other impurities, and must therefore be renewed twice daily.

The three dyeing compartments B, B' and B", with a total capacity of about 650 gallons of liquor, are charged with equal quantities of dye liquor. This solution consists of 2½ lbs. of dry Oxy Diamine Black J. B. per 10 gallons of water together with some soda. The bath is replenished during the passage with 5 per cent. of dry Oxy Diamine Black, on the weight of the goods to be dyed. For a daily output of about 2600 lbs. weight, an addition of a solution composed of 143 lbs. of dry Oxy Diamine Black and 13 lbs. of soda ash dissolved in 130 gallons of water, must be added at regular intervals and be divided between the three compartments. The speed of the machine is so regulated that a 100 yard piece remains about 3 minutes in contact with the liquor. The machine is usually provided with a small automatic measuring dial and bell which rings at each 100 yards, thus indicating when the color solution is to be added. Having passed through the machine, the goods are laid off into a truck by means of rollers G, held by an oscillating arm H. The cloth is then ready to be rinsed. It is advantageous to defer rinsing the cloth for a little while after dyeing.

The dye-baths can be used continuously for many months and should be exhausted as far as possible before renewing, by passing the goods through without adding fresh color.

Jiggers and continuous machines, used for dyeing with immedial colors, are provided with several pairs of guide rollers between the dyeing and rinsing compartments, over which rollers the goods are passed, thus giving them a short passage in the air to effect oxidation of the dye before they pass into the rinsing bath.

The after treatment of dyeings with metallic salts, in order to increase their fastness, can be carried out in an open vessel, a jigger or a padding machine. In an open vessel, the goods are treated at a temperature of from 175 to 195 degrees F. for from 20 to 30 minutes. In the jigger or padding machine two passages in a boiling hot bath are generally sufficient, with the additions to the bath divided for each end.

Dyeings to be after treated with sulphate of copper must be well rinsed after dyeing, so that the goods will be thoroughly freed from alkali. Should the sulphate of copper bath become turbid, acetic acid must be added. The goods must be well rinsed after treatment with metallic salts.

DIAZOTIZING AND DEVELOPING MACHINE.

The diazotizing and developing of dyed piece goods is often used to increase their fastness to washing. The continuous machine has given excellent results in this work when properly fitted up. This system can therefore be recommended when working on a large scale, the operations being easily carried out in one passage.

A cross sectional view of a diazotizing and developing machine is shown in Fig. 3.

The machine consists principally of three vats A, B and C and three tanks D, E and F. A is the diazotizing vat; B is the rinsing vat, and C is the developing vat.

The tank D contains sodium nitrite and is connected by a pipe G to the diazotizing vat A. The tank E contains dilute hydrochloric acid and is also connected to the diazotizing vat A by means of a pipe H. The mixture of sodium nitrite and dilute hydrochloric acid form the diazotizing solution. The tank F contains the developer, such as Beta napthol, and is connected to the developing vat C by a pipe I.

The vat B contains the rinsing water, which is slightly acidulated with hydrochloric acid.

The diazotizing vat A is held filled with water for the first charge, 2½ ounces of nitrite of soda and 8 ounces of hydrochloric are added per 10 gallons of liquor. The

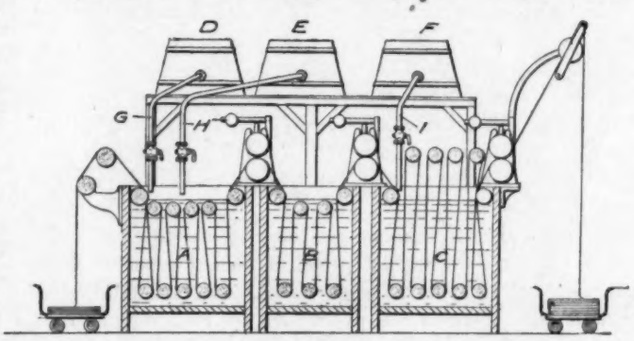


FIG. 3. DIAGRAM OF A DIAZOTIZING AND DEVELOPING MACHINE.

other tanks D and E are charged with 1 per cent. nitrate and 3 per cent. hydrochloric acid on the weight of the dry material to be diazotized. During the passage of the piece through the machine, nitrite and hydrochloric acid are run separately from the tanks D and E into the diazotizing vat, the flow of the two liquids being so regulated, that they are absorbed as soon as the pieces have passed the machine.

The liquids need not flow continuously, and the tops of the tanks may be closed if it is seen from the gauge glasses that too much nitrite or hydrochloric acid has been allowed to run into the vat in a certain time.

The proper condition of the diazotizing bath may be judged by the smell; the bath should always smell perceptibly but not pungently, of nitrous acid. If the fumes of nitrous acid should cause inconvenience in the dye house, (a trouble which can hardly occur with correct working) a hood to carry off the fumes, may be fixed above the diazotizing tank or it may be covered up tightly with a lid. The rinsing tank B is provided with running water. Some dilute hydrochloric acid is added from time to time during the passage of the cloth so that the rinsing water is always slightly acid.

From the rinsing tank the cloth passes to the developing tank C and from there it is taken out of the machine to be finally washed and dried.

(To be continued.)

PRIZE CONTEST LETTERS.

OPENING AND MIXING COTTON.

BY W. P. H.

Some one may ask, what is the use of so much care and extra labor in opening and mixing cotton? My answer is this: The weaving mills demand a stronger and evener skein yarn that is now being put on the market, and they are willing to pay a premium of ¼ to 3 cents per pound for such yarn, running as close as twenty-five points to the number required. And they can well afford to do it, because weak and uneven skein yarns with a variation of two to three numbers either way from the standard, will reduce the production on looms, cause a greater per cent of waste, and after experiencing these two serious troubles they have an inferior grade of cloth which they can not sell at prices that are profitable.

Many spinners run their "average" numbers a number or more on the heavy side. For example, suppose a mill is running No. 30s; they make 28½s to 29¼s and sell them for 30s. The spinner can run more pounds, and during prosperous times make more money at the expense of the weaver. Such business is unfair and the weavers who purchase yarn for their loom are beginning to consider the product of such mills as inferior. When they purchase such yarns, they invariably get them at one to three cents below the standard market price, or do not consider them, and they are right in doing so. The reader can readily see that he who makes a big production by running his numbers heavy is generally the loser at the selling counter. No weaver can run such yarn except at a loss when they pay market prices for the material.

The writer was running a small mill during the year 1907-08. We graded and inspected every mixing; not one bale did we let pass into our mixing room unless the staple was the proper length and clearness. The result was that while most yarn mills were stopped entirely or curtailing and sparing their production, we were able to sell every pound at a premium as fast as it came from the mill. I mention this only to illustrate my subject, and I may say here that the books of that company will show that during that year the warps did not vary more than one pound in one hundred at one time. The skein yarn was weighed and tested, and a record kept each day showed that it did not vary more than one-half number from the standard at any time. The yarns we were running were No. 30s and 40s. We ran our short staple strips and spinners mostly into No. 8s, and this yarn did not show a variation of more than ten points.

I want to emphasize the fact that no one can keep their numbers regular without using cotton, every bale of which grades and pulls the same. When this is done the other is easy. Every mixing should be stirred thoroughly and torn into small particles before entering the machine. The setting of mote bars is another important feature. First set the beater ⅛ inch to 3-16 inch. Then set the mote knives ¼ inch at the point nearest the rolls, and ½ inch at the bottom of the lowest point. The cages and flues must be kept clean; a flue choked up and full of any kind of dirt and cotton will cause the beater to throw quite a lot of valuable lint into the mote boxes. One would not think so much of this could exist in cotton mills in this country. But stand around one of the large waste purchasing and sorting establishments, and one can find nearly half the motes opened to be full of excellent staple.

The practical man looks at the bale of motes as it is opened, and makes up his mind that the operative does not clean out the flues, neither does the overseer inspect the waste. To get good even work the cotton should be passed through three or four process machines and doubling not less than four on all. If we double four, the draft should be about four. With four doublings on each intermediate and finisher, the total doublings is $4 \times 4 = 16$. If we have first and second intermediates and finisher after passing the opener, the doubling is $4 \times 4 \times 4 = 64$.

The laps should be carefully weighed and none allowed to pass into the room that vary one-half pound from the standard. If the weight of laps varies, the evener belt lever can be adjusted. On Kitson machines the position of this adjusting lever is located over the feed rolls, resting on a center point with an adjustable latch over the end. By moving this latch toward the center, the belt acting on the cones will be moved farther each way by the action of the evener motion; or by moving the latch toward the end of the lever, the belt will be moved less distance on the cones, and act less on the variations in the bulk of cotton passing under the rolls.

A good way to get best results is to set the latch 9½ inches from the center rest; take off one lap and test it several times during the making of one lap. See if it weighs right. If it is light your evener belt does not act as far as is necessary, so move the latch closer to the center. By trying this occasionally you get your evener set right; then set the others the same distance. On Atherton lappers this adjusting arrangement is near the floor under the feed rolls and apron, and has the same effect by moving up and down, as does the latch on the Kitson. On Platt machines this adjusting arrangement is on the left hand side of the machine and is moved up and down to get results.

VARIETIES OF COTTON.

BY J. C. M.

Cotton yarns are those made from seed fibers of the cotton plant which belong to the botanical genus gossypium, of which there are a number of species. The genus gossypium belongs to the order of malvacea. The principal species cultivated for commercial purposes are the gossypium harbaceum, gossypium barbadense, and the gossypium arboreum.

The species known as gossypium herbaceum grows to a height of from two to six feet, and like most species of cotton is an annual plant having to be planted each year. It is found in the southern part of the United States, and largely in northern Africa and Asia. The gossypium barbadense is a shrub, but attains a height of from five to ten feet; this is also an annual plant. It produces the longest cotton fiber known and is almost exclusively cultivated in the islands off the coast of South Carolina and Georgia.

The gossypium arboreum is not of much importance commercially, but is interesting from the fact that it grows to a height of from fifteen to twenty feet; the fiber thus derives the name of tree cotton. It is a perennial variety, thus distinguishing it from other species of the cotton plant. While this plant is sometimes found in Asia, it is most frequently met with in Central and South America. Cotton fiber is known to commerce simply under the name of cotton in English speaking countries, although by some people it is spoken of as cotton wool. Its German name is baumwolle; its French name is coton; in Spanish it is algodon; and in Italian, cotone. The botanical classification of cotton is not used commercially, but a geographical classification has been made, which has also been extended to cover the yarn made from such cotton as American cotton yarns, Egyptian yarns, Peruvian yarns and Surat yarn with subdivisions. Those are derived either from the name of the seed from which the plant is grown, such as Allen seed, which is a variety of American cotton, or local names such as Peelers, Uplands and Boweds, which are also varieties of American cotton. The names given in this classification refer to the cotton from which the yarn is made and not to the country in which the yarn is spun. Egyptian yarn means yarn spun from cotton grown in Egypt, notwithstanding the fact that the yarn itself may be made in America, England or other countries.

HANDLING HELP.

BY H. E. W.

In handling help I think the first thing to take into consideration is the place in which the operatives work. The room should be clean and well ventilated, and the place kept in a neat and tidy condition, as no good help wants to work in a dirty, ill-kept room. In placing an operative at starting time to fill someone's place who is absent, no overseer or his assistant should ever ask a hand if he will take this place to-day, but should simply assign him to the place they want filled, because if you ask him if he will take it, it gives him a chance to complain.

No hand should be placed in a position where there is more work than he can do, because it is only a matter of time before he is discouraged, and he will leave your employ. Every untrained operative should be placed with some reliable hand to learn, and not given work faster than his ability warrants. I have seen lots of cases where new hands have been given more work than they could do, and have not stayed very long, and furthermore they tell it around that it is too hard in that place, which keeps many others from applying for work. The overseer should instruct his assistants that whenever they are speaking to a hand about his work, they should not storm and rage at them, but address them as they would like to be spoken to. All overseers, speaking to their section men and the help, should tell them in as few words as possible what he means, and then not stop to see if they have anything to say, for very often they will get into an argument and then both may say or do something they would be sorry for later.

When an overseer has reason to complain to a hand about work, he should make it very plain what the results will be if it continues, and if it does continue he should take some action, and not be like some overseers I have seen who have threatened to lay off or discharge such help, but have never done so. Such a lack of discipline causes bad work to increase all the time from not only one, but from others who will soon become careless. Therefore, I think you will have a better class of help who will respect you more if they know you are positive with them, and mean what you say.

Overseers should study the disposition of the different classes of people under them, and should not show any favors to any one, but treat all alike. The man who has the best help and always the most, is the one that makes the work agreeable for them, and sees that their machines run properly; also that the section men are polite and not always quarreling when wanted.

MILL SANITATION.

BY W. T. B.

In my opinion one of the most important features of a successfully managed cotton mill, is the care which should be paid to the sanitary conditions around the mill. It will be found that where the management of the mill does not display the proper interest and care as to the health of the operatives, to the cleanliness around the mill grounds, and more especially to the mill village, that the employees will not give the required attention to their homes and yards, which is necessary for healthful conditions.

It is of vital importance that all mills should have necessary sewerage and water facilities. Some may say that it is impossible; it most emphatically is not impossible. Those who say it is, really mean that it will require an outlay of money that is not available for that purpose. It will cost a large sum of money to install a system, but what does this expenditure of money mean when so much is in the balance? Furthermore, in time it will pay for itself, for with happy, satisfied operatives, better work will come, and employees will, instead of continually migrating as they do now, settle down and display the interest that is always found in old employees who have been in employment at one place for a number of years. And every one acquainted with the industry knows that with such operatives better quality goods is the result, then there will be less friction between factions, and numerous other benefits which could be enumerated.

Attention is not only required at the mill, but to a large extent in the village, for where weeds are allowed to grow up, and trash to accumulate in summer, such places are splendid mosquito breeding homes. A good plan would be to require those who occupy the village cottages to cut their own weeds, and upon failure to do so impose a small fine. If this is not a feasible plan, then either offer rewards to the tenants who have the neatest and most attractively kept yards and houses, or employ a man to attend to this throughout the summer.

In regard to the trash, let the mill furnish barrels or boxes of sufficient size, so that it will only be necessary to remove them every two days. If the mill is located in a city, then the trash will be collected by the sanitary wagons once a day, but if the mill is situated outside of the city limits, or in a small place, then let the man whose duty it is to keep weeds cut down, collect up trash every day or two and burn it.

I find that operatives do not give much attention to things if they have no fences separating the houses. For some may be trying to have gardens, while a neighbor is

raising chickens, ducks, etc. One can imagine what will be the result, and naturally there is some enmity between the employees, which in most instances to a certain extent is a good thing. An added incentive is given the co-operation between operative and the management when neat fences are around the cottages, and if they are constructed when the houses are built they would add very little expense to the total cost. It has been found that friendly rivalry between operatives is about the best stimulus to the desired end, and should be easily possible to bring about.

DISTURBANCE OF THE TENSION ON ROVING FRAMES.

BY W. S.

Evenness of roving has always been a subject of importance, and must always be a potent factor in the production of good yarn and cloth. It is my object in writing this article to tell the reader some of the conditions that will cause a disturbance of the tension. It may be said in a general way that tension on roving means the amount of pull on the strand of cotton during its passage from the front roll to the bobbin. It is evident that the pulling of the roving from the front roll is due to the fact that the surface speed of the bobbin barrel is greater than the surface speed of the flyer arm through which the strand of cotton passes on its way to the bobbin.

The cones of a roving frame are its most essential feature, as upon them depends the perfect winding of the roving. The more accurate their outlines, the more perfect the winding will be, and the more perfect will be the roving produced. Now, what is the cause of strained roving? The surface speed of the front roll and the excess surface speed of the bobbin over the flyer should be equal. Such has been the well-founded and almost universally accepted theory (although it has not received much attention) for many years. So many inches of stock are delivered by the front roll per minute, and just the same number of inches must be wound upon the bobbin in the same time. Now consider the spindle and flyer as stationary, and assume that the roving will draw through the flyer without twist and without breaking. Thus it will be seen that the surface speed of the bobbin must equal the surface speed of the front roll.

Now, what influence have the top rolls on the subject? The top rolls must be kept clean, they must also be oiled well, and kept free from any dirt which might tend to clog them. The proper care of top rolls is as important as the winding-on problem. If the top rolls are allowed to become badly worn, a resultant friction is caused on the top roll, which shortens the length of the roving. Any of the preceding evils tends to cause a constant and extra pull on the strand, making a more compact bobbin of a smaller diameter than the rest of the bobbins on the frame. Thus we have two bobbins of different diameter running on the same frame, and the only remedy for this is the doffing of the frame, because a frame in the above condition will become more troublesome as the diameter of the bobbin increases.

On the other hand to obtain the proper results from the true outline of the cones, constant watchfulness must be given to the cone belt. When pieced, both ends of the belt should be squared, so that it will follow a straight line. It should also be cleaned every morning and a little belt soap added. Any improvement over the use of a cone belt would be most welcome, for the good working of the cones depends upon this small piece of belting. It is obvious that the proper care of the cone belt is as important as the top rolls. It has been noted at various periods in mills that speeder tension in a short time is in bad state, due to the carelessness of the speeder tenders, oilers and fixers. This is caused by speeder tenders and fixers not thoroughly understanding speeds in the arranging the commencing and the ending of tension throughout the set.

Overseers and fixers who understand the winding-on problem are a great help and encouragement to either poor or good speeder tenders. Remember this, that it is only a decrease in the excess speed that effects the problem of winding, and it is only those parts of the machine governing the excess speed that have their own speed changed, and that the oiling of all parts of the carriage is as important as the care of top rolls and cone belt. It will be readily understood that the speed of the bobbin is made up of two parts, that is, a speed equal to the speed of the flyer, and another speed which is called the excess speed of the bobbin.

The differential motion is used for adding the variable speed of the cones to the positive speed for the forming of the twist. Differential motions are almost alike on all speeders, except that they are geared in a different way; instead of a bevel gear, others use a spur gear. The bottom cone drives the compound, the top carriage and bobbins, and as the bottom cone alters the speed it is a driver, and the cone belt does as much work with the so called new differential motion, as with the old. The only claim for the new differential motion is, that the sleeve rotates in the same direction as the driving shaft, thus eliminating a certain amount of friction. To prove that the cone belt is a driver, remove the carrier gear that meshes into the gear on the new differential motion sleeve, and then turn the driving shaft, and it will be found that the differential sleeve will rotate in the opposite direction to the driving shaft.

ECONOMY IN HARNESSES ON DOBBY LOOMS.

BY H. L.

Our Southern cotton mills and operatives can scarcely be called experiments now, as they have in some instances in the past been so held up to the world. Our mills are modern, and equipped with up-to-date machinery. Every labor-saving, cost-reducing machine that is put on the market finds as ready acceptance here as in the North. This has been the rule for a number of years past; consequently our factories everywhere are producing almost every grade and kind of cotton fabric that is being sold in the markets of the world. While in the past we only attempted to manufacture plain coarse goods, our mills are now turning out practically every kind of plain and fancy figured cotton cloth and fine yarns.

Some of our operatives have become as skilled as the operatives in the East, especially in weaving cotton fancies, and it is of fancy weaving and designing that I wish to treat in this letter. In designing or laying out the design for a fabric the designer of course is bound to be governed by the maximum number of harnesses that his loom and dobby head will operate. For instance, some mills are equipped with eight harness looms, some with twelve, some with sixteen, and some with twenty. Consequently the fabrics woven must come within the scope of these respective numbers of harnesses.

When the designer lays out his draft for a particular pattern, the number of harnesses required to weave the pattern decides of course whether it is adapted for that loom. But the point I wish to bring out in this article is one that is overlooked in a great many mills here, either through lack of knowledge or fear of their help not being intelligent enough, and that is the use of cross drawing-in drafts. The reasons for not using these are really not sound, for as I have said before, our help can grasp any problem in fancy weaving as quickly as the best help anywhere. If a pattern is laid out for a 20-harness weave, straight draw, it is possible in nine times out of ten to reduce this draft by cross drawing, so that it can be woven on sixteen or possibly less harnesses and give identically the same fabric. The only hardship of using such a draw—which is only a fancied hardship—is the extra care on the part of the weaver to learn the draw; and you will find that before a cut has been woven off the loom the weaver has learned the draw as well as if it were a straight draft.

Of course you can not over-crowd your harness with yarn for the sake of reducing your number of harnesses, but in the great majority of fancy weaves you do not have to guard against over-crowding. The advantages of reducing your number of harnesses is apparent on account of the less power required on your loom, the smaller number of harnesses to buy, clean, and repair, and less loom fixing; and naturally you will pay less for weaving a ten harness weave than a sixteen. The two most important reasons, however, are the first two named. The use of the cross draw gives you a wider range of designs, very often enabling you to compete by weaving a very profitable line of goods being woven by other mills. Again always remember the cardinal principles in any kind of weaving are a good shed and the reduction of strain on the yarn to its lowest point; and the further away the harnesses are located from the beat of the pick, the smaller the shed and more tension you have to make to get the proper shed. Consequently every harness you can eliminate, lessens the strain on the yarn just so much.

Now I am not trying to get up any argument on this subject, but these facts are known and practiced by a great many of our successful mills. But for the mills that have no designer, or are just starting in on fancy weaving, I say scrutinize your design closely and cut out all useless harnesses. If space permitted, I would give you a sample design on 20-harness, and the same design woven on 12 as an illustration; also cite a mill that is weaving quite elaborate 72-harness Jacquard patterns on 20-harness dobby heads, but your own observation on your own patterns probably will show you where you can save a harness here and there.

A CARDER'S TROUBLES.

BY S. C. P.

The quality and quantity of a carder's trouble will depend to a great extent upon his mental calibre. If he is of an excitable temperament, given to spells of irritability upon the least provocation, he will encounter many things that will cause him lots of trouble. But if he is of an even temperament, calm and well poised, and has at all times and under all circumstances full control of his faculties and can exercise those rare traits of freedom and independence proper to true manhood, his trouble can be reduced to a minimum. But even then he will have some troubles. First, he may have an unreasonable superintendent who may require of him impossibilities. For instance, he may be required to produce a certain production each week, which may tax his machines to their utmost capacity. Then if he should have a "break-down" which is inevitable at times, there will be a falling off in his production and a cause of trouble.

Again, the help may be scarce, and he may not be permitted to carry along some spare hands; then if a hand is "out," he is obliged to stop the machine or "double up" and hence cause a falling off in his production. If he is really interested in his work, this will give more or less trouble. I knew a carder who could not sleep on account of thinking and wondering if all his help would be in at starting time. Then again, lack of competency is a cause of much trouble to some carders. Through some chance or luck or influence they have gotten the position of carder when they do not understand the business thoroughly. I have known carders who could not make a radical change on any machine in their department, but had to depend entirely on their second hands to make all the changes, figure out the required gear for draft, twist, etc. This surely, if not a source of trouble, is very embarrassing.

Then the stock is another source of trouble. In a mixing of some 70 bales I knew a carder who threw out fully one-half as being below the standard as to cleanliness. It lay in the opening room a few days. The superintendent examined it and sampled it and finally decided to "mix it in a little at a time," so the carder was obliged to use it in the face of constantly returning complaints of "dirty yarn." Another cause of trouble for the carder is being on unfriendly terms with the spinner who will then magnify every little defect he can find and run to the superintendent with it and bring more or less unnecessary trouble to the carder. But if the carder is on friendly terms with the spinner, so that they may reason together as men should on all the various difficulties that occur of interest to them both; if he is practically familiar with each and every machine under his charge; and if he is thoroughly acquainted with the different grades of cotton so that he can tell at a glance what is and what is not up to standard; and if his circumstances in life are such that he can be free and independent, his troubles will not be more than others in different branches of skilled mechanics.

How to set the rest on a shear: Lay the rest centrally right and left in its place on the top end frames. Test its edge, the sides being pulled out to their end positions, with the straight edge and dry tissue paper, both on top of the edge and on the back of the edge toward the blades. It should pinch the paper equally at every point. If there are a few high places and these are slight, they can be worked off with a fine flat file drawing it lengthwise. If the inaccuracies are considerable, the rest must be turned on a planer.

Ledger blades of a shear vary slightly in width, and when a new knife is put on an old ledger casting it will vary from its former width when new, hence the necessity parallel with the body of a shear frame.

The boxes of a shear should be level, so the fly blade gudgeons bear evenly their whole length; the fitting of the boxes to the frame and leveling must be done at the same time.

MARKET REVIEWS.

MONTHLY REVIEW OF THE COTTON MARKET.

BY H. & B. BEER, NEW ORLEANS.

After having passed through a most strenuous period, the cotton market gradually righted itself and is once more in its normal condition. Since our review last month, price variations have been confined to a narrower range, and at the moment quotations are only a shade lower than they were during the last week of last January. Liverpool has been the mainstay of the market during the past thirty days, home demand and continental buying, owing to the necessity of having future requirements, being more than ample to care for all offerings, futures or spots. As a result, there has been a very large business transacted during the past four weeks in the English market, which, in consequence, has ruled comparatively steadier than the American markets, resulting in the wiping out of the former large premiums prevailing in America prior to the collapse in values. This is as it should be, and the probabilities are that trading henceforth will be done on a more satisfactory basis.

As to the future course of values much will depend upon the supply and demand; the former is small. Of American cotton, on February 18, the world's visible supply was only 3,370,000 against 4,419,000 one year ago, while the South on the same date had about 1,000,000 bales less to market than was marketed after the corresonding date of last season. In order to make both ends meet, the spinners throughout the world are resorting to short time, and unless the demand for raw cotton continues good, it is probable that there will be enough of the old crop, plus the carry-over at end of last year, to go around. The South, however, shows little disposition to sell on important declines, and it may be that owing to the firmness of the Southern holders, high prices may prevail during balance of the season.

Prospects for the next crop are beginning to attract attention. At the moment the outlook in Texas is not altogether satisfactory, nor in Oklahoma and Arkansas, for while the precipitation west of the Mississippi this winter has been heavier than the rainfall last winter, the severe drouth of all last year in Texas has made the soil so dry that the winter rains have been insufficient to put a good season in the ground. Until the situation is relieved by generous general rains, prospects for the new crop in that state will remain unsatisfactory. In the eastern half of the cotton belt, conditions are just the reverse, there having been too much rain east of the Mississippi River during the past month, and while it will probably prove to have been of benefit in the long run, farm work at the moment is being retarded.

As to the acreage, there is no doubt of it being largely increased in the Southwest, but there is a fear that the increase will not be as large as generally expected owing to the very high prices for grain and provisions. The drouth of last year has left the Southwest bare of corn and provisions, and as prices for grain and hog products are unusually high, the latter selling at prices higher than for the past 40 years, there is as much of an incentive on that account to plant a big acreage in corn as there is in the high price of cotton, which, for new crop deliveries, is not so very high when the cost to make the new crop is taken into consideration. In some sections of the South corn is selling for $1 per bushel and provisions are so dear that pork is selling around $25 per barrel. In the Valley, in Louisiana and Mississippi, small farmers find it difficult to obtain funds in advance to grow cotton, the merchants and bankers not caring to risk their money on the boll weevil, despite claims of its extermination as a result of the past severe winter, but all the money wanted to make corn and meat can be had for the asking.

By the close of this season, the world's visible supply of American cotton will be reduced to a minimum, perhaps to less than 500,000 bales; mill stocks to about the same figure, making a shortage of about 2,000,000 bales with which to commence the new season. Last year's visible and invisible reserves on September 1st, were $3,052,000 bales. Therefore, the world will need fully 14,000,000 bales to replenish stocks and for consumption next season, and there is no assurance of such a big yield being provided.

THE YARN MARKET.

The yarn market during February was a continuation of the dull and unsatisfactory condition of the previous month, with a falling tendency in prices. Buyers and sellers appeared to be unable to come together and transact anything but a desultory business. Prices had declined to figures which the majority of mills could not accept without a loss on every pound sold, and at the same time buyers contended that the low prices received from their product made it out of the question for them to pay the prevailing quotations. There was not a bright spot in the entire month, and every week seemed to bring about a more depressed condition in the market.

The mills have held out very consistently for higher prices for a long time, but it is believed that the time has about arrived when the majority of them face a situation which means that they will either have to get business or close down. A great many mills have been curtailing for some time, but it has not been sufficient to improve prices, due to a large extent to the presence of stock yarns on the market that were sold at concessions from regular quotations. However, it is the general opinion that the supply from this source has been practically exhausted, but there will doubtless continue to be more or less available. It is probable that yarns stored at the mills awaiting improved conditions will finally have to be placed on the market at a sacrifice. This yarn was in a majority of cases made from high priced cotton, and at present quotations for yarns, represents a distinct loss. The lower figures in the cotton market will doubtless help matters in the future to some extent, but the fact remains that a great deal of yarn was made from 15 cent cotton and over, and has not been sold.

On the other hand, buyers have contracted for yarns very sparingly and their position is relatively good, in that they are in position to consider business at the lower levels of prices prevailing. This fact was apparent by the number of inquiries from buyers during the latter part of the

month. Some of the dealers, however, doubted the sincerity of the inquiries, believing them to be only for information in making up prices of their products for the next season. At the same time it seems to be a recognized fact that weavers and knitters are practically out of material, and they will doubless be attracted by the lower quotations to fill their requirements.

THE KNIT GOODS MARKET.

Business in the knit goods division was quiet during the month, with prices remaining firm. Buyers have been watching the cotton and yarn markets very closely, and when prices declined to some extent for those commodities, they looked for an immediate shading of prices in hosiery and underwear, but their expectations were not fulfilled. However, a good many inquiries were made by jobbers but little business eventuated.

Retailers' shelves are reported to be practically empty, and it is said that their stocks are lower at the present time than for a two or three years. Jobbers have evidently refrained from buying in quantities, thinking that prices would work lower, but from the action of the market of last month, it would seem that the tendency will be rather toward higher levels, especially in some lines where the prices have not risen from the range at which they were made last year, based on 10 cent cotton.

Duplicate orders for spring hosiery were reported to be in considerable quantity, and a run is predicted later on for light weight hosiery which will be very popular this year, similar to the two previous years.

Buyers of next fall's stock seemed to give the preference to the fleece-lined goods over the plain staples, owing to the more favorable price, but manufacturers are not pushing the sale of the goods, owing to the low price of cotton hosiery compared to the advances made in cotton and yarns since last year. It will be remembered that the price of full-fashioned hosiery did not advance last fall, after such large imports had been received from Germany before the new tariff law went into effect. The business that formerly went to Germany is expected now to be taken care of by domestic mills which gives rise to a very optimistic view of the situation in that line. It is probable that the Chemnitz manufacturers will not stand by passively and see the business taken entirely away from them, and a great deal of interest will be shown in the steps they will take to meet the increased duty imposed.

The lack of demand was met by the manufacturers by curtailing production sufficiently, so as not to accumulate goods, and at the same time their working organizations were not disrupted. This plan has put the manufacturer in a strong position technically, and is a good indication that prices will be maintained, if not advanced later on when the demand becomes brisk.

EGYPTIAN COTTON PROSPECTS.

The Alexandria house of Mohr & Fenderl, Boston, Mass., has informed the Boston office in regard to the prospects of the next Egyptian cotton crop, as follows: The Egyptian government, moved by the bad out-turn of the last cotton crop appointed sometime ago a commission consisting of agriculturists, irrigation engineers, and practical people experienced in the cultivation of cotton, with the object of studying steps to be taken to avoid in future the devastations experienced this year. This commission has decided at its first meeting held recently, to divide the work into two categories, the first viewing the urgent steps to be taken in order to obtain a better result next season, and the second to make studies and trials of all sorts in order to secure for the future a general improvement in the cotton cultivation.

The damages experienced this season have been caused by the caterpillar, the profusion of water during the months of September and October, and finally by the boll weevil; and the point in question therefore is to combat these evils. What has been given the most thought so far is the abnormal rise of the level of the ground water, and it is therefore this which must be remedied this year. They will try to keep the level of the water in the Nile and in the irrigation channels much lower, and to keep the outlet channels freer in order to avoid the infiltration, which did a great deal of harm this season. The roots of the plants have come into contact with the ground water much too early and instead of growing better they rotted. They will therefore let much less water get into the channels even at the risk that the planters may be compelled to use more machines for the irrigation of their land, and they will be altogether much more parsimonious in the distribution of the water.

In order to attain the destruction of the caterpillars, severe laws will be passed compelling the planters to take off the infected leaves as soon as the caterpillars appear, and there will be inspectors appointed to overlook this work. They will also try to find some means for destroying the boll weevil which however seems to be still more difficult than the destruction of the worm. The boll weevil has been known a long number of years but it has never caused any appreciable damage before. This year, however, it has caused a great deal of damage, perhaps the intense humidity through the profusion of water has also helped it.

One has to admit that the steps which the government will take with the aid of this commission although they may not be the ideal, will do a great deal towards the prosperity of the cultivation, and that with not too much unfavorable climatic conditions, as are to be hoped for, it will be possible to save the country a further calamity such as it experienced this season.

It was also recommended to sow the cotton earlier, and planters seem to be willing to follow this advice; in fact a lot of activity is noticed in the southern provinces with the preparation of the land for the cotton cultivation which in former years was not the case at this time. In upper Egypt this work is already much advanced, and there one can also reckon that the cotton cultivation will be much increased especially as the provinces of upper Egypt have suffered very little from the caterpillars or too much water. In the Delta the surface will probably also be a little increased."

Rooms in exposed locations or on the north side of a building always require more heat than those more fortunately situated. These can be accommodated without making any change in the heating plant proper, by placing auxilliary coils in the main ducts leading to the points where extra service is required.

Cotton is used in the mining and marketing of coal. About 15,000,000 yards of cotton duck annually are made into coal bags.

The Textile Mill Situation in the South and New England.

SOUTHERN MILL SITUATION.

(*Special Correspondence.*)

Unfavorable conditions continue to prevail in yarn markets, and Southern mills are just now facing a very grave situation. "There is practically no market for yarns," said T. W. Crews, secretary of the Southern Hard Yarn Spinners' Association, when asked about the general situation affecting Southern hard yarn mills. "The situation is the worst for years. I hear that many mills are curtailing. This seems to be the only thing to do. Twenty-twos two-ply are bringing 23 cents, and this represents a figure far below actual cost of production. Mills can not continue full operations and lose two to two and one-half cents or more per pound."

Other well known authorities discussed the situation in similar fashion. One prominent manufacturer said: "The only bright spot is in some lines of fine yarns and some few lines of colored goods. Sheetings and coarse goods are far below cost of production, and about on a basis of 11-cent cotton. The situation is the worst in ten years in cotton yarns and many lines of cloth. There are many indications that there is at least co-operation, if not organization, among big buyers to control the market, and there is certainly a lack of co-operation among the manufacturers. Many buyers have been led to believe that they may expect 10-cent cotton next fall, and have refused to buy ahead when cotton is around 15 cents; but should they become convinced that the next crop would not be excessive, and that no low price will prevail for cotton, they will not hesitate to enter the market, and buy at present figures, which are known to be below a parity with 15-cent cotton."

In the present crisis, curtailment appears to have become not so much a matter of choice, as a necessity. The mills can not stand the losses that will follow should they continue to operate on the present basis. Consequently, reports from various Southern manufacturing centers indicate that curtailment movement is becoming more general than heretofore. Several big mills around Charlotte have adopted the four-days-a-week policy and report has it that others will follow the example. At Gastonia, N. C., the Modena Mill has decided to shut down one day each week during the month of March and two days a week thereafter, or until conditions warrant full operations. Three mills at Lenoir, N. C., one at Hudson, one at Dallas, and several at Fayetteville and elsewhere in North Carolina, have also recently inaugurated a short time policy. The Rhodes-Hiss, Lincolnton, N. C., has temporarily suspended operations entirely; the string of Erwin mills located at Durham, N. C., and elsewhere, have begun curtailing and are now running only four days a week.

The conference of cotton manufacturers from North and South Carolina and Georgia, held recently in Greenville, S. C., has attracted considerable interest among manufacturers. At this meeting the subject of organizing a Southern Cotton Mill Mutual Insurance Company was fully discussed. Such a company would place the insurance of all of the mills in the States mentioned. After a full discussion of the subject, the following resolution by W. E. Beattie was unanimously adopted: "Resolved, That we are satisfied the time has come when it is advisable to organize a Southern Mutual Fire Insurance Company for the purpose of insuring the property of cotton mills in North Carolina, South Carolina and Georgia; and that as several of the presidents of the New England Mill Mutual companies favor such an organization, that a committee be appointed composed of three from North Carolina, three from South Carolina and three from Georgia for the purpose of formulating the plans of organization, and that said committee be ready to report at Charlotte, N. C., in May at the time of the regular meeting of the American Cotton Manufacturers' Association, or at the June meeting of the South Carolina Cotton Manufacturers' Association."

The members appointed after the adoption of the above resolution are as follows: From North Carolina, J. W. Cannon, C. W. Johnson and W. C. Ruffin; from South Carolina, W. E. Beattie, V. M. Montgomery and E. Nicholson; from Georgia, S. B. Gordon, T. Barrett and Dr. Jeff Davis.

One of the most interesting textile gatherings of the month was that of the Southern Textile Association, held at Columbia, S. C., at which over 300 delegates attended.

A very interesting topic during the past month in Southern mill circles has been that of the proposed combination of Southern mills engaged in making coarse and medium weight sheetings and drills. Announcement was recently made that representatives of large capitalists in the North and West were canvassing mills of the South, engaged in this line of manufacture, with the view to forming a combine of interests, and that the majority of such Southern manufacturers were decidedly favorable to the proposition. It is understood, on highest authority, that most of the manufacturers so far approached are favorable to the proposition, save those having close connections with commission merchants. During the past few weeks representatives of the New England capitalists backing the scheme were in the Charlotte vicinity canvassing mills engaged in making brown sheetings of medium heavy weights. It is intimated that the combine may later be extended to include other classes of mill products. The men behind the proposition are New York capitalists of large means, and, with their associates, represent ample funds to finance the scheme.

Several years ago a similar effort was made to perfect such an organization in North Carolina, but the scheme fell through because promoters did not have sufficient capital to finance it.

It is pointed out that the cotton manufacturing industry is the only one of any consequence which is not organized, and the result is that to-day it is seriously demoralized while other industries are prosperous. Promoters of the combine insist that the organization can be perfected without violating, in any sense, the laws relating to combinations.

One of the most remarkable features connected with the growth of the textile industry in the South during recent years, and one brought to striking prominence by the recent issuance of statistics, is the tendency to build only big mills. For many years Southern manufacturers spe-

cialized on coarse goods, bringing low figures. The consequence was that when there was some slight derangement in this specific line, the entire milling industry of the South suffered. That day is fast passing. Manufacturers are following the example set by Southern farmers, and are diversifying. During the past year more has been done in this direction than during any period of several years heretofore.

The day of the five or ten or fifteen thousand spindle mill is fast passing, and to-day in the South a mill is not classed "a big mill" unless it is equipped with 50,000 or more spindles. During the past year numerous really big mills have been set on foot, while others are under contemplation. The biggest mill of the South just now is the Riverside and Dan River Mills Co., Danville, Va., which has 230,000 spindles and 7,500 looms. Next in point of size is the Erwin mill, Durham, N. C., which has 158,000 spindles in its four mills. Next comes the Union-Buffalo of Union, S. C., with 151,000 spindles. There are eight corporations in the South having 100,000 or more spindles and many equipped with 50,000 or more.

A decided stimulant to cotton manufacturing in the Piedmont section of Carolina is the development of the electric power. Many of the mills are availing themselves of this cheap power, and many large mills have been organized near sites of the various hydro-electric plants of the Southern Power Co. One of the largest developments of the Southern Power Co., located seven miles from Blacksburg, S. C., on the Broad River at Ninety Nine Island, will soon be completed. Its capacity is 24,000 electrical horsepower and this with other plants completed will give the company 105,000 horse-power. Much of this power has been contracted for by mills along the company's lines.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence.*)

A review of the textile mill situation in New England, for the month of February would be incomplete without emphasizing the fact that the paramount problem for cotton manufacturers was to fill out the statement of earnings for the year ending December 31st, as required by the government under the new Federal corporation excise tax law. Many, yea, multitudes of mill treasurers sighed a profound prayer of relief when the statements were signed, sealed, and delivered. The return was difficult to make because the system of bookkeeping used by a large majority of mills conflicted directly with the requirements for the Federal statement, and in a large number of cases expert auditors and accountants were employed to secure the facts and figures required. In another year the statement will be less difficult to compile, because accounts will be so handled this year that the requirements of the government can be more easily met. Because of the strong probability of many decisions as to the constitutionality of the law, many mill treasurers have deemed it necessary to carry raw cotton and stocks of goods on hand at lower prices than ordinarily, so that the net earnings will not be exaggerated.

The greatest objection to the law is the publicity clause, and if this can be eliminated or modified it will prove advantageous to the government because the return of taxes paid will be largely increased. Corporations do not object to paying a small toll to the government for the many advantages over a partnership; but when one's earnings and confidential income accounts are thrown open to the public for careful inspection and analysis by competitors, there is a socialistic aroma to the law and its effect. Furthermore, this clause relating to publicity places a premium on inaccurate returns and evasion of the law. It many respects the law is crude and needs amending and revising.

General business in New England suffered a reaction during the last week in January and first half of February, so that earlier predictions that this year would be the banner one in our country were modified, and economists are now inclined to the opinion that 1910 will be slightly halting, as it were, and if no serious industrial, financial, or commercial conditions develop, the year 1911 will set the pace for a period of record breaking prosperity. The demand for textile fabrics has been very light during the month just passed, in fact, many commission houses report business for the first half of February below any previous two weeks for over a year. Prices have been held firm because it was very evident that slight concessions would not create business of any volume, so it was wisely concluded not to sacrifice to stimulate orders. Converters have been rather more eager for prices than during the previous month, and it is generally understood that converters' stocks are at the lowest point than for some time, and they must enter the market during March.

Just as soon as prices of print goods advance, there will be a movement to buy Fall River prints at a concession. It is intimated that this fact is appreciated, and although an advance is not justified at this time, it will attract buyers, and heavy sales will be made at prevailing prices which will then be under the market. Ginghams and particularly the finer grades of dress, are being well taken on the new seasons offerings, and such mills as the Parkhill, Lancaster, Boston Mfg. Co. and York are running full time with sufficient orders for the better grades to carry them far into the summer. Cheap ginghams are quiet but prices hold firm. Southern ginghams are being offered at a slight concession, and are selling well to the middle and far Western trade. Marshall Field & Co. have placed large orders this month for low-priced Southern ginghams for spring delivery.

John C. Eames, vice-president of the H. B. Claflin Co. recently stated that it was absurd for the trade to think of cancelling orders for cotton goods, because prices are higher to-day than when orders were placed, and there is nothing short of absolute commercial stagnation that can prevent prices from being advanced during the spring months. Even if the 1910 crop of cotton is to be the largest on record there is a shortage of raw material to-day, and during the late spring and early summer months there will be a greater shortage of raw cotton, and prices will have to be advanced. The brightest spot in the New England textile situation is the gingham market, and there is so much confidence in the permanency of this favorable condition that the big Parkhill Mills at Fitchburg, Mass. will start 2,000 looms this year on these fabrics, and the Lancaster Mills at Clinton, Mass., have announced a new stock issue to provide funds for a new weaving mill to operate on fine grades

of ginghams. The Boston Mfg. Co. will probably announce another addition to its gingham plant this summer.

The cotton yarn markets seem to be chronically weak and soft. There is little buying of hosiery yarns, because the demand for cotton hosiery for fall delivery is restricted to a very few grades and buyers are unwilling to pay prices that will allow a fair manufacturing profit. Fleece lined goods are selling well, however. Weaving yarns are quiet and soft with a few purchases of Southern goods at from one and a half to two cents under the established quotations. Yarn dealers are more hopeful than for several months, and they report a very much better feeling for the finer counts.

Inquiries during February showed an improvement over January and indicated a disposition of buyers to place orders at concessions. However, with the depressed yarn market and the quiet fabric market, mill men are of the unanimous opinion that only about ten per cent. of the spindles in this country are idle. This is a remarkable statement and if it did not come from authentic sources it could easily be doubted. It is believed by Boston mill treasurers that partial curtailment may go into affect in Fall River on account of the action of the textile unions in that city, which have unanimously agreed not to renew the sliding scale agreement now in force. It is unfortunate that this action was taken just at a time when the fabrics market is in such a depressed condition.

Textile machinery builders report a satisfactory number of new orders received, considering the condition of the fabric and yarn markets. One prominent loom builder stated that ordinarily when the fabric and yarn market is as quiet as at present there is very little interest in new machinery; but this year, mill operators appear to be looking ahead and considering the future demands that will be made for their products. During the month of February no less than eight large Massachusetts cotton mills announced new stock issues for the purpose of providing funds for new mills or additions. The new mill to be built by the Massachusetts Mills in Lowell, Mass., is to be used for the manufacture of government army fabrics. It will be installed. The Stafford Co. is making castings for 1,000 looms to be installed at the big Maverick Mills, in East Boston. Supply houses are doing a larger business than last year because of the many new mills that are in the course of construction.

Cotton mill stocks sell higher at every auction held in Boston. The high priced issues, such as Bates, Pepperell Amoskeag and Androscoggin appear to be in unlimited demand and at every sale there are from four to eight bidders. All of these issues advanced last month in the face of general depression in the stock market. Several large Boston bond and stock dealers are publishing booklets descriptive of textile stock and are advising their clients that they have established departments for the handling of orders in textile securities. This is a very satisfactory recognition of the investment value and stability of cotton mill stocks and an appreciation of the industry. Fall River and New Bedford stocks are selling at best prices. Dartmouth has advanced because the stock has been placed on a 16 per cent. annual dividend basis as compared with 12 per cent. for last year.

NEW MACHINERY AND TRADE NOTES

AN AUTOMATIC MERCERIZING MACHINE.

This automatic mercerizing machine is for skein yarn and is built on the St. Georgen system, which was patented in 1899. This machine gives an even mercerization to the skeins under treatment. The machine as shown in Fig. 1 consists of six pairs of rollers set around a central shaft. Diagram Fig. 2 shows the arrangement. One roller of each pair has a smooth surface. The smooth rollers are driven by a chain, while the other rollers are corrugated and are driven by the skeins of yarns that are placed on them. Each pair of rollers is loaded with skeins of yarns to its capacity. The corrugated rollers are connected with an adjustable tension lever E as shown in Fig. 3, to regulate the tension for skeins of different lengths.

The shaft carrying the rollers revolves, taking the skeins of yarns successively through the different operations of mercerizing and at the same time keeping the yarn at the tension which is necessary for the best results. The machine makes one-sixth of a revolution each minute. While one pair of rollers is being stripped and loaded, the yarn on the other five are in different stages of the mercerizing process.

The operations are as follows: The rollers in front of the machine where the attendant stands, that is, those shown at the left hand side in Fig. 2, are loaded with skeins of yarn, the smooth and corrugated rollers comprising the pair being closer together at this point than at any other time during the process, in order to allow the yarn to be easily placed in position.

The main shaft of the machine is then revolved carrying the pairs of rollers around so that the yarn is immersed into the mercerizing liquor in the trough shown at the bottom of Fig. 2. When the shaft begins to revolve, the arm E carrying the corrugated roller is acted upon by a cam R located on the machine, so that the corrugated roller is moved farther away from the smooth roller, thus creating a tension on the skeins of yarn under operation. The action of the cam gradually increases the tension on the yarn during the operation to counteract the shrinking tendency of the yarn.

As the yarn is being immersed in the mercerizing liquor,

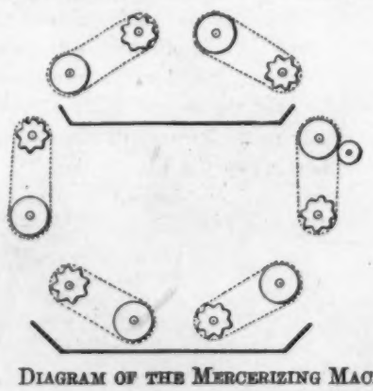


Fig. 2. Diagram of the Mercerizing Machine.

caustic soda is also sprayed on the yarn through spraying pipes located just above the mercerizing trough. The rollers then pass into the third position, that is, the lower right hand pair shown in Fig. 2, the same process of impregnating and spraying with caustic soda taking place. In the fourth position, shown at the right hand side of the

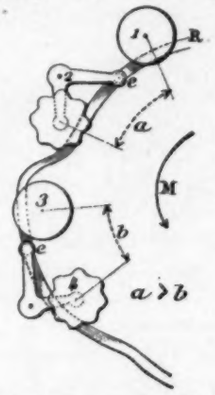


FIG. 3. DIAGRAM SHOWING THE CAM FOR APPLYING TENSION.

drawing, the caustic soda is squeezed out of the yarn by means of rubber rollers, said caustic soda flowing back into the trough at the bottom of the machine. From there the rollers revolve to the fifth position where the yarn is washed and rinsed in warm water. After the first revolution of the skein, the rich waters containing most of the mercerizing liquor are collected and go to the storage tank. The pipe closes automatically, and the rest of the water pours into the drain. The sixth, or last position, is where the yarn is washed and rinsed in cold water, which completes the operation, and as the pair of rollers revolve to the original position, the skeins of yarn are ready to be removed, and the rollers are in position to be loaded again.

The effect that the cam has upon the tension of the yarn under operation, may be seen by referring to Fig. 3. The distance B represents the position of the rollers just as the yarns start into the mercerizing process. The distance A represents the position of the rollers just at the completion of the process. It will be noticed that the distance A is greater than the distance B. Cotton, like other vegetable or animal fibers, has certain physical properties, and behaves in a different manner when subjected to different conditions; for instance, caustic soda bath, a warm washing bath and a cold washing bath each affects it differently. The tension of this machine carried out in an original scientific way, adapts itself to the physical properties and action of the yarn. Each individual pair of rollers is provided with a lever and weight attachment, to decrease or increase the tension of the yarn in the various operations. Besides the cam which the rollers have to follow, resulting in a variation of the tension, an individual tension arrangement of each pair of rollers is provided to regulate the tension for the various qualities and sizes of the cotton yarn.

The machine is stopped for every sixth of a revolution to take off the mercerized yarn and load on new material. Every time the main shaft rotates, a system of cams and levers operate the various movements of closing the hot and cold water pipes, and as soon as the rollers have arrived in their position, every part starts to working again automatically.

Each pair of rollers is loaded with about two pounds of yarn which is the production per minute. In coarse sizes, somewhat less than two pounds are loaded on, and in fine sizes over two pounds are placed on the roller. The daily average output in ten hours is about 1,200 pounds. All of the main parts are made of steel, and the rollers run in ball bearings. The machine requires 3 H.-P. for operating it. The principal advantages may be summed up as follows: Thorough impregnation and thorough washing; low consumption of caustic lye; continuous circulation of liquor,

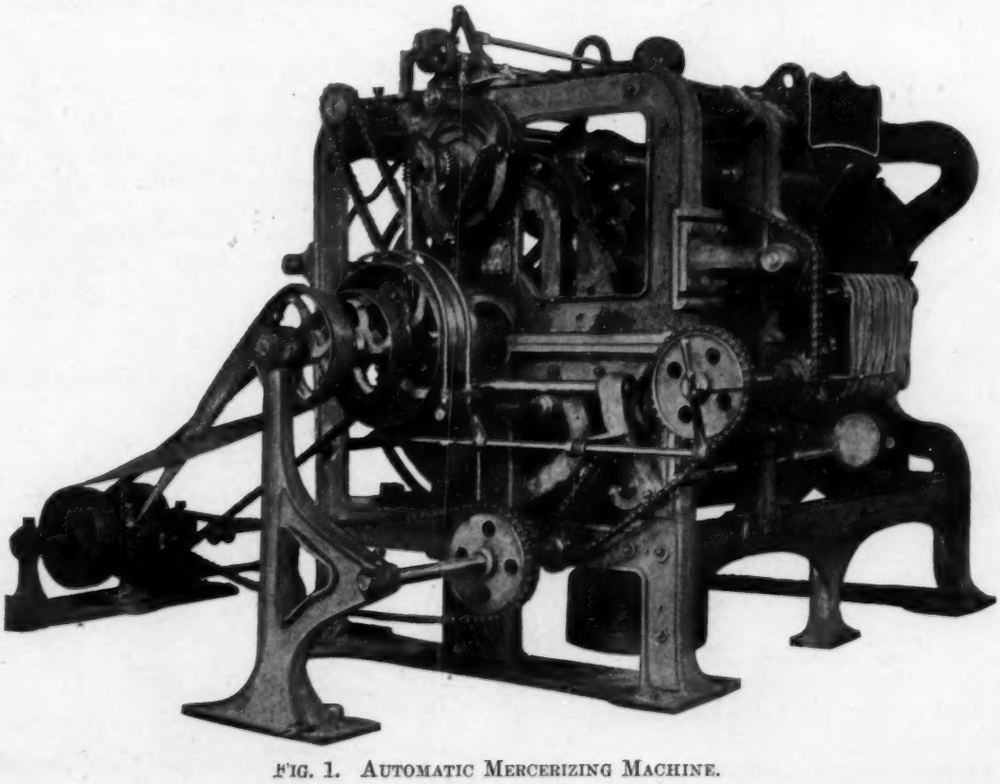


FIG. 1. AUTOMATIC MERCERIZING MACHINE.

uniform strength and temperature; separation of the rich and the poor washing liquor; perfect automatic work; considerable saving in labor, requiring only one man; correct and automatic tension application in the various operations; and reliable and economical working construction.

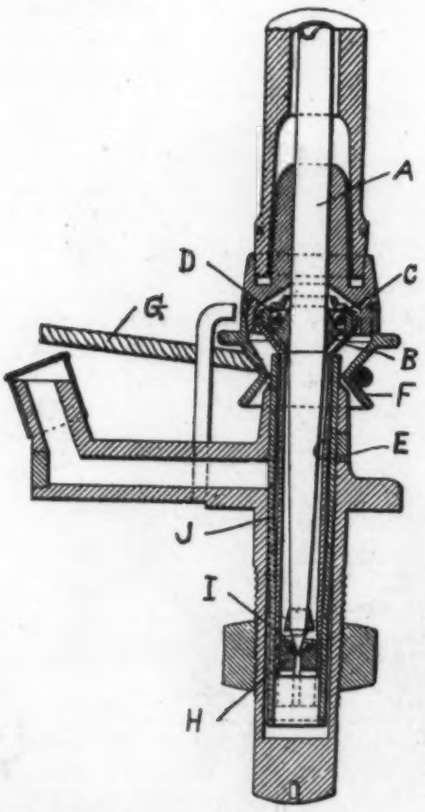
THE SUPPLEMENTARY TREATMENTS IN THE MERCERIZING PROCESS.

The alkaline solutions are very adherent, and the best washing arrangement can not remove all traces of alkali. The soda, therefore, is neutralized in a warm bath containing sulphuric acid, and is washed again in warm and in cold water. It has not proven practical to do the neutralizing or souring on the machine, although it has been done, but is not advisable. There are various methods of obtaining a "crackling" effect with organic acids, such as lactic, acetic or tartaric acids. To obtain a soft touch, a solution of boric acid or a simple bath of soap is employed.

For embroidery cottons the hydraulic lustering machine is employed, where the cotton is exposed to considerable heat and tension, which produces a high silky luster, that is not permanent, however. A. W. Buhlmann, 487 Broadway, New York City, is sole agent for the mercerizing machine described.

CHAPMAN GRAVITY SPINDLE.

The object of this invention is to provide a spinning spindle with ball bearings and with a capacity for longitudinal and lateral adjustments whereby the spindle may accommodate itself to the load, thus permitting the running of the spindle at a high rate of speed with greatly reduced power, and producing yarn properly twisted, using an extremely slack band that would be inadequate with spindles in common use.



Cross Sectional View of Spindle.

The details of the new spindle are shown by means of the accompanying illustration which is a cross sectional view showing the arrangement of the parts. The spindle A has a cone B to support steel balls C which are held in place by the bolster cup D located at the upper end of the bolster E. It will be noticed that the ball bearing arrangement is located slightly above the whirl F, which receives a lateral stress due to the action of the spinning band G.

The lower end of the spindle rests in a step H at the bottom of the bolster, and is provided with steel balls I to reduce the friction. The bolster E is supported by a movable sleeve J, which accommodates itself to the movements of the spindle and bolster, at the same time preventing the bolster from turning. By thus having the bearing points below and above the whirl, the gyration due to the pull of the band is taken up by the sleeve J, the result being that the bobbin runs quite steadily.

Comparative tests with other types of spindles have been made, and it is claimed that with this spindles there is a marked saving in wear and tear on the spindles, oil and bandings, and that the quality of the yarn is improved. The test was made on a frame from the Lowell Machine Shop containing 224 spindles with 1 5/8 inch rings and spinning No. 35s warp. The Chapman spindle had an average band tension of 1.5 pounds at the beginning of the test while the other spindle had 3.21 pounds tension. The speed of the spindles was 8,800 revolutions per minute. The average power required to drive the frame of the Chapman spindles was 2.05 H. P., or 109.3 spindles per H. P., compared with 3.23 H. P., or 69.4 spindles per H. P. of the other make of spindle.

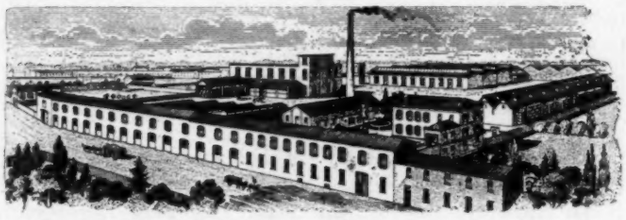
The Chapman spindles can be seen in operation in connection with the chapman automatic spinning rings at 97 State St., Boston, Mass.

THE LARGEST WASTE DEALERS IN THE WORLD.

W. Wolf & Sons, Boston, Mass., are probably the largest dealers in the world in cotton, cotton waste, wool, wool waste, raw silk, silk noils, ramie, and other fibers, their different warehouses being found in all parts of the globe where textile manufacturing is carried on. The firm was established in the early part of the last century by W. Wolf, in Stuttgart, Germany. The four sons of Mr. Wolf were taken into their father's business as they grew up into manhood, and are still the principal owners in the copartnership.

In order to be in closer touch with their growing trade in America, an office was established in Boston, Mass. in 1894 with modest quarters consisting of one room at 620 Atlantic Ave. In the course of a few years this location became inadequate for the needs of the business, and the ground floor of 556 Atlantic Ave., containing 2,000 square feet was secured for office purposes. The continued growth of the business in a few years required them to secure the six-story building at 549 Atlantic Ave., which was remodelled for their purpose with offices on the two lower floors, the upper floors being used for the storage of imported fibers. In addition to this building, the firm now has four buildings on Commercial Wharf which are used for storage and manufacturing purposes. They have excellent shipping facilities, connecting with all railroads as well as water routes.

The character of the business naturally requires a great amount of exporting and importing, and it is claimed that their facilities in this line are unexcelled. The Boston plants represent only a small portion of the business when compared with some of their European headquarters.



FACTORY OF W. WOFL & SONS AT MONZA, ITALY.

In 1897 twenty acres were acquired in Monza, Italy, and a factory was erected for assorting, cleaning, and dyeing cotton waste, which is collected from mills in Italy. Wiping waste is also made here. This plant is to-day considered one of the largest of the kind in the world.

In 1898 an office was opened in the Mariners & Merchants Building, Philadelphia, with warehouses in the city for keeping material in stock for the local trade.

In 1899 a large factory was erected on a tract of land in Bombay, India. The business has since increased to such an extent that this plant alone handles over 100,000 bales of cotton and cotton waste, supplying European, American, and Asiatic mills with this stock. Wiping waste is also manufactured in this plant. A factory was built in Shanghai, China in 1900 for the purpose of assorting native cotton and cotton waste, which is collected from the mills and shipped to all parts of the world. In 1901 a factory was erected in Manchester, England for the purpose of assorting and cleaning the waste collected from the English cotton mills and for manufacturing wiping waste. In 1903 a large plant was acquired in Grimmitschau, Saxony, which takes care of the cotton waste produced in the mills of northern Germany and vicinity. In 1905 a large factory was established in Munchen-Gladbach, Prussia, for taking care of the business of that textile district, as well as of Belgium and Holland. Another plant is also operated in southern France.

By 1906 the original plant at Stuttgart had been outgrown, and a modern fire-proof factor was erected on a tract of about sixteen acres on the outskirts of the city, with excellent railroad facilities. The cotton and wool waste produced in southern Germany Switzerland, France and adjoining countries are treated here, wiping waste is manufactured, and cotton and cotton waste dyed. The office building has a floor space of approximately 20,000 square feet., which is used for the accounting department and sample rooms, employing over 100 clerks who take care of all of the bookkeeping for the business in the different countries. Every branch office cables its transactions each evening to the home office.

The firm has an importing depot at Hamburg, Germany; this depot is located on a four-acre tract of land, having a water front with wharf and storage facilities for 50,000 bales of cotton and cotton waste. It is said that W. Wolf & Sons are the only importing house with their own docking facilities at this port. It is easy to understand, from the above detailed list of plants, the claim that this firm makes to being the largest cotton waste concern in the world. The different branches are operated as separate units but at the same time with a co-operation that enables them to supply the wants of manufacturers with the necessary raw material because if the desired staple is not obtainable in the same country, it is procured from one of the other branch houses. The practically unlimited facilities of this company to supply any description of raw material in any quantity is a great advantage to all manufacturers. A case in point may be cited: Of late certain mills in America, owing to the high price of American cotton, have been making experiments with cotton produced in China and India, which can be supplied through

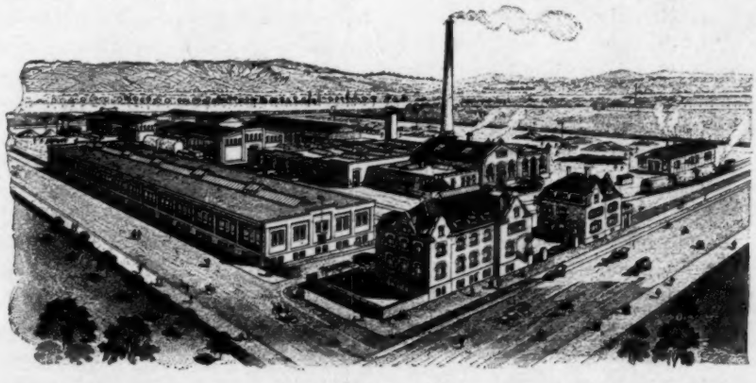
W. WOLF & SONS' FACTORY AT GRIMMITSCHAU.

this concern. Furthermore, any information regarding the stock can be furnished by the firm. American manufacturers can be supplied at any time with samples from a large stock always on hand at the Boston office. Importations and additions are continually being made to the stock.

NORMAN CORDAGE MACHINE.

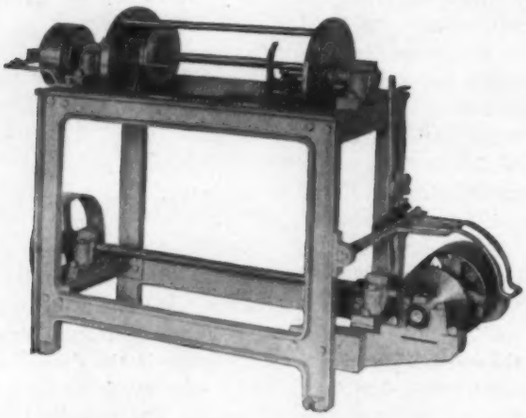
One of the latest types of machines for making cotton rope has just been introduced by the Norman Cordage Machine Co., 35 Congress St., Boston, Mass.

These machines consist essentially of a former and a



MAIN OFFICE AND FACTORY OF W. WOLF & SONS AT STUTTGART, GERMANY.

layer, an illustration of the former being shown in Fig. 1. This former is a very easy running machine and its production is said to be double that of the ordinary former running at the same speed. The flyer is belt driven, but



A New Type of Forming Machine.

at the same time the pull-down is positive. The take-up spool is frictionally driven, and does not revolve with the flyer. The tension on the strand can be made very light, and for this reason the machine can handle the tenderest stock.

The laying machine, it is claimed, will make the hardest and best rope on the market. For the past few years, in order to test thoroughly the machines, the company has been making a cotton rope and marketing it under the name, "Norman Weatherproof Clothes line." This line has been made with a core in each strand of jute or yarn made from cotton waste. This rope being extremely hard laid, on account of its serviceability, has brought a top price in the market.

One of the largest mills in New England has installed a plant embracing several of these machines and sees in them a partial solution of the vexed waste problem. These machines are especially adapted for making trawl lines most of which are now made on rope walks.

JAMES HOLDEN, ROPE MANUFACTURER.

The cotton rope manufacturing business of James Holden, 559 Ridge St., Fall River, Mass., dates back to 1856. The first James Holden was brought up in Blackburn, England, where he learned the cotton spinning business very thoroughly, coming to this country in 1852 and learning the rope making trade at the Brooklyn Navy Yard. In 1856 Mr. Holden took charge of the spinning the Metacomet Mill, Fall River, Mass., and held this position until 1859 when he started in the business of making cotton rope and mill bandings. His mill had the distinction of being the first plant of the kind to be established in Fall River. From that modest beginning in the cotton rope business, over fifty years ago, the plant has been continued under the name of James Holden, although Mr. Holden, Senior, died in 1874. Owing to the youth of James Holden, Junior, at the time of his father's death, the business was managed by Mrs. Holden from 1874 to 1891, when the present owner, James Holden, assumed charge of the plant and has continued to manage the business with great success.

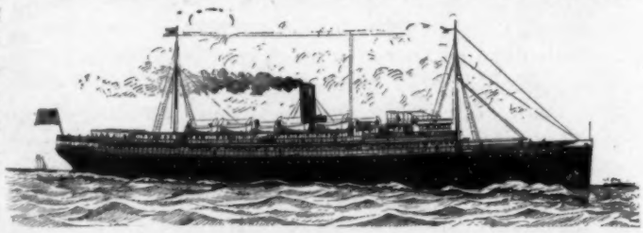
The equipment of the factory includes all of the machinery necessary for preparing the cotton from the time it leaves the gin until it is delivered as rope or banding. Originally everything was made in the rope walk and that process is still used to a limited extent; but the larger part of the product is finished on modern machinery. In addition to the production of spinning department, large quantities of yarn are purchased to meet the demand for the product of the mill.

THE "CITY OF MONTGOMERY."

The "City of Montgomery" is the name of a new vessel launched at Newport News, Va., on February 28th, by the Ocean Steamship Co., of Savannah, and within a month the "City of St. Louis" will be launched by the company from the same place. These twin sisters of the Savannah line fleet will ply between Savannah and New York.

The "City of Montgomery" and the "City of St. Louis" are 6,200 tons apiece, each measuring 404 feet in length, and nearly 50 feet in breadth. The draft of the twins, when fully loaded, will be 18 feet 6 inches, and the holds below the draft-line are divided into water-tight compartments, which make them unsinkable. These modern vessels are provided with every safety device, including wireless telegraphy.

The designers of the "City of Montgomery" and "City of St. Louis" had problems of their own, for the Savannah line being in the North-South trade must face unusual conditions. At no time in the year do these vessels enter



The "City of Montgomery" of the Ocean Steamship Co., of Savannah.

or leave the port of Savannah in the same temperature that they do in that of New York. Therefore, in the building of these ocean-going hotels it was necessary to provide for the winter frigidity of New York as well as for the rose-laden breezes of the Southern port. Electrical appliances will cool and ventilate the state rooms in summer, and the heating and ventilating systems for the winter will be just as complete.

The full complement of passengers will be 136 first-class, 36 intermediate and 57 in the steerage. There will be ten suites of bed rooms and private baths, the baths here, as elsewhere on the vsesels, being immaculate in tile and enamel and furnished with hot and cold, salt and fresh water.

Berlin Aniline Works, New York City, have just issued two color sheets, one describing Guinea Black 3 B L extra, which is particularly adapted for the dyeing of ladies' dress goods in the piece; and Metachrome Orange 3 R which is of a redder shade than the Metachrome Orange R double. This is used on wool in the production of fast reddish orange shades according to the usual methods for dyeing metachrome colors. Dyeing recipes are given on the sheets together with the properties of the colors. Any one interested may address the company and receive copies of these color sheets.

PRIVATE TELEPHONES IN COTTON MILLS.

An interesting solution of the problem of intercommunication is furnished by a big cotton yarn mill at New Bedford, Massachusetts. The answer to the question of how best to secure instant connection among the different departments of a manufacturing plant has always been sought, and has been found with varying degrees of success. Messenger boy service and speaking tubes now seem to have given way to the telephone method.

The New England Cotton Yarn Co. operates twenty separate plants, ten of which are located at New Bedford, Mass. This company is said to be the largest cotton spinning organization in the world. Up to date methods in the mills are apparent, as shown by the accompanying photographs which give the locations of some of the private telephones in the old Bennett mill at New Bedford. Telephone stations have been installed at 31 central points in the mill. The system was designed and installed by the Western Electric Co. This system, known as the "Interphone," is peculiarly well adapted for the needs of an establishment of this kind. The constant use of this intercommunicating method reduces to a minimum all confusion, rushing about and noises, and puts the superintendent of the plant within instant access of each one of his more important subordinates.

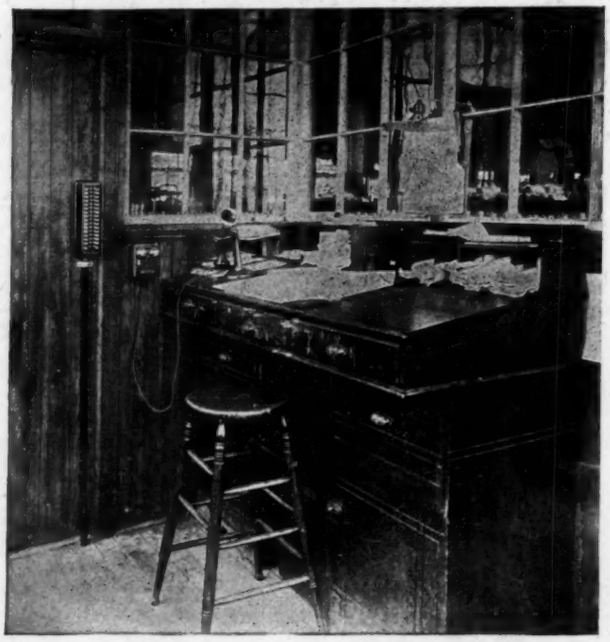


FIG. 1. SUPERINTENDENT'S DESK, SHOWING DESK TELEPHONE SET.

As shown in the accompanying photographs, each of the supervising offices connected with any of the other departments is equipped with the desk telephone set. A metal key-box, as shown at the left of the superintendent's desk in Fig. 1 contains the thirty-one buttons through which connection is made with the other stations of this interior system. When the superintendent or foreman of any department wishes to talk with some one in another department he presses the button opposite the name-plate of the station desired. This rings the bell at the called station, and if any one is within hearing distance, communication is secured without an instant's delay.

The feature of the "Inter-phone" system in the New Bedford mills are its automatic operation and its low cost and maintenance expense. No operator is required. In the store room of the machine shop as shown in Fig. 2 but one piece of apparatus is used to contain both the key-box and the telephone. A similar installation is shown in Fig. 3 for the engineer's office.

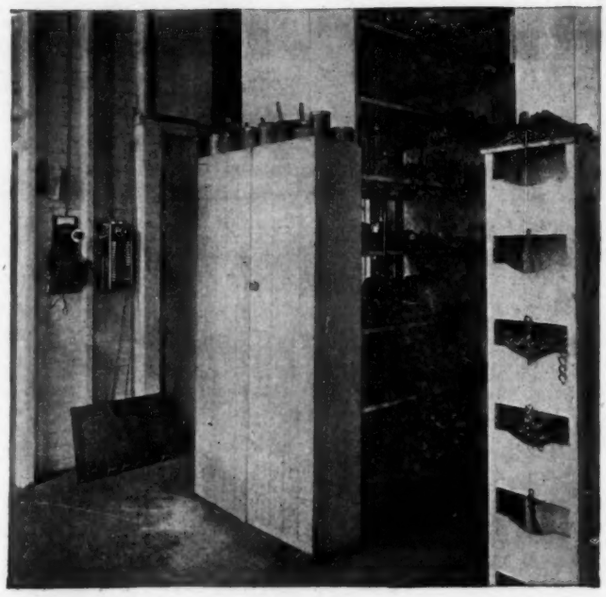


FIG. 2. ONE-PIECE TELEPHONE SET IN THE STORE ROOM.

COMMONWEALTH HOTEL.

Among the many hostelries of Boston that enjoy a high reputation for the reception and entertainment of their guests, both transient and permanent, none holds a more enviable position in the minds of the public than that of the Commonwealth Hotel, of which Storer Francis Crafts is the proprietor. One of the most centrally located hotels in the city, yet removed from the immediate noise and roar of the busy streets, the accessibility of this house from the

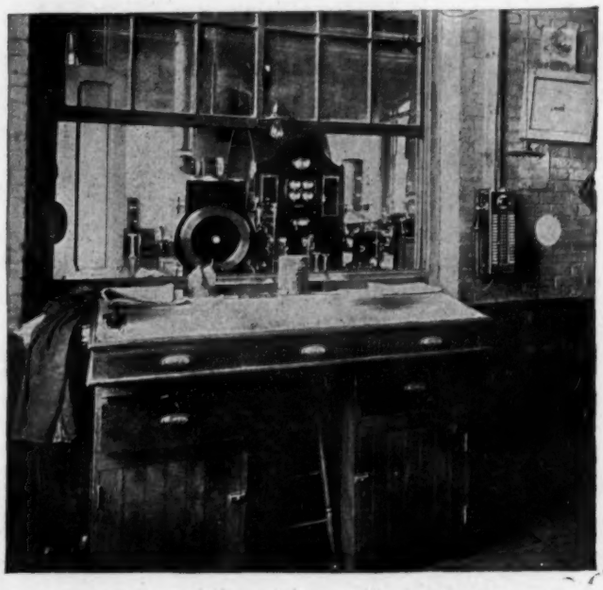


FIG. 3. ENGINEER'S OFFICE, SHOWING ONE-PIECE TELEPHONE SET.

great retail stores and places of amusement in the city makes it one of the most popular places of residence in the metropolis.

During the evaneglical campaign of Dr. Chapman, who so ably held in Boston last winter one of the most successful revivals since the days of Moody and Sankey, the Commonwealth Hotel was made the headquarters of Dr. Chapman who resided there with his corps of assisting clergymen.

The statement has been made in some quarters that it is impossible to run a hotel profitably without a bar; that is, to conduct a house on strictly temperance principles is sure to result in financial loss. This claim is directly refuted by the unqualified success from the very beginning of the Commonwealth Hotel. The house has never had a bar, nor has intoxicating liquor of any kind ever been sold within its walls. Much of the success of the Commonwealth is a family hotel and its popularity among the traveling public, is due to the scrupulous neatness that marks the entire house, and the quiet order and homelike cleanliness that is constantly maintained throughout the hotel.

There are over two hundred rooms in the Commonwealth Hotel and ninety of these have private baths. The house is strictly fireproof, being constructed throughout of stone, with nothing to burn but the doors. Long distance telephones are in every room, and a pair of electrically operated elevators give constant service day and night. Although offering extra accommodations and complete service, the arrangement of rates is such that guests are assured of receiving more for their money than any other house in Boston.

NEW PUBLICATIONS.

"A BRIEF OUTLINE OF THE BUSINESS OF WILLIAM WHITMAN & Co." is the title of an interesting book recently published by that well known house. The work contains pleasing descriptions of the scope and organization of the various plants with whom they are connected, and many details in the history of the various plants and their processes are given in a most entertaining style. The work can not fail to impress the reader with the stability of the enterprises which represent the cumulative effect of years of successful achievement. The principal plants described and illustrated are the Arlington Mills, Lawrence and Methuen, Mass.; Manomet Mills, New Bedford, Mass.; Nonquitt Spinning Co., New Bedford, Mass.; The Eddystone Mfg. Co., Eddystone, Pa., and Nashawena Mills, New Bedford, Mass.

Much valuable information on wool and cotton production in the United States and the world is given; different diagrams are shown illustrating the prices of wool, cotton, and cotton yarns from 1900 to 1910, and prices of raw cotton and staple cotton fabrics from 1906 to 1910.

The subjects of Mercerizing and Improved Conditions in Modern Mills, are also treated in a very interesting manner. The work as a whole reflects much credit upon its author.

THE JANUARY 1, 1910, EDITION of the Southern Cotton Mill Directory has just been issued by "The Textile Manufacturer," Charlotte, N. C. This directory is to be issued semi-annually on January 1st and August 1st. The work gives the name of the cotton mill, its location, equipment, capitalization, names of officers and the product. Initial letters indicate the kind of power used. An alphabetical list of the mills is given at the back of the directory. Copies may be obtained through COTTON. Price $1.00.

MASON MACHINE WORKS, TAUNTON, MASS., have just issued their 1910 catalog on Mason Ring Spinning. The catalog gives a thorough description of the ring spinning frame, explaining the builder motions by means of lettered illustrations. Complete twist tables are included, giving the number of twists per inch, for the different kinds of yarn, from numbers 1's to 150's. Production tables, breaking strength of yarn, sizes of rings and bobbins, traveller table, and comparative traveller table are given, and also rules and calculations connected with the spinning frame. The catalog should prove of value to the superintendent and spinner, and constitute a ready reference book for them. A copy of the catalog may be obtained by addressing the home office.

CONCRETE REVIEW, published by the Association of American Portland Cement Manufacturers, Philadelphia, Pa., is a very interesting paper and takes up in its Bulletin No. 23 the subject of concrete tanks, giving valuable information in regard to the building of the same. A number of illustrations are given showing different types of the concrete tanks used for different purposes.

LIBERTY MFG. CO., Pittsburg, Pa., manufacturers of high-grade power plant accessories, describes in an interesting catalog its different products used in connection with power plants. These accessories may be summarized as follows: The Liberty-Greenaway separator is used to prevent foaming of the boilers, the Liberty cleaner makes the Saturday cleaning of boiler tubes thorough. The twin strainer keeps the dirt out of the water supply for the boiler or condensing water. The Faber blow-off valve will not leak, for the reason that the valve is connected to a small pipe which in run is connected to the boiler or branch steam pipe. The Liberty feed water regulator prevents the water level from fluctuating. The Greenaway oil separator takes all of the oil out of the exhaust steam. The Liberty oil purifier precipitates about 90 per cent. of the impurities, leaving the filter bags to remove only the light flocculent particles, which will not precipitate.

BERLIN ANILINE WORKS, NEW YORK CITY, have recently issued sample cards describin gthree new sulfur dyes known as Sulfur blue D, Sulfur blue R extra, and B extra. Sulfur blue D is dyed in the usual manner for sulfur dyes without after treatment and yields dark navy blues which are distinguished by their fastness to washing and light. Sulfur blue R extra and B extra are also dyed in the usual manner in a vat containing sulfide of soda without after treatment and yield bright blue dyes of very good fastness, the R extra brand being especially distinguished by great purity of shade. On account of their ready solubility both Sulfur blue R extra and B extra are well adapted for machine dyeing.

OTIS ELEVATOR CO., in its January issue of the "Indicator" gives an illustrated description of its exhibits at the Alaska-Yukon Exposition, which was a great success. The issue treats interestingly of "Electric Dumb Waiters," "Single-Phase Alternating Current Elevator" and "Controlled Systems for Hand Rope Operation." A directory of offices in the United States, Canada and foreign countries is given on the last page.

DRAPER CO., Hopedale, Mass., in its January issue of "Cotton Chats" prints an excellent likeness of the late Gen. Wm. F. Draper, formerly president of the Draper Co. The resolutions of the committee appointed by the directors on the occasion of the resignation of Gen. Draper as president of the company are also given.

What is probably one of the most interesting bits of information in regard to textile machinery is given in the issue in the shape of an alphabetical list of the cotton mills in the United States using Draper looms and the loom equipment of each mill.

JOS. DIXON CRUCIBLE CO., Jersey City, N. J., in its February issue of "Graphite" gives a very interesting article entitled "A Test of Paint Pigments" in which forty different pigments were used in the test. Among the other articles of interest on that issue are "Dixon's Flake Graphite," "Mr. J. H. Lewis, Manager of Dixon's Atlanta Office," and "Graphite as a Lubricant for Gas Engine Cylinders."

THE MILNE WATER TUBE BOILER CO., New York City, has just issued a 1910 booklet on modern water tube boilers, Milne system. The booklet is thoroughly illustrated and gives many important facts in regard to the Milne water tube boilers. A copy of the booklet may be obtained by applying to the home office of the company.

CORTRIGHT METAL SHINGLE ADVOCATE, issued by the Cortright Metal Roofing Co., Philadelphia, Pa., has a very attractive February issue, which illustrates and describes many points of interest relative to Cortright Metal Shingles.

HACKING & CO., LTD., Bury, England, who are pioneers as builders of plaiting or folding machines for cloth, desire an agency in the United States to represent them. Over 8,000 of these folding machines have been sold, which is a splendid recommendation for their usefulness and efficiency.

FARBENFABRIKEN OF ELBERFELD CO., New York City, have just issued a folio of color sheets comprising wool dyeing supplement No. 2. This folio is gotten up to represent a bound volume 7x11 inches, and presents the color sheets in a very convenient form, for reference.

S. A. FELTON & SONS CO., Manchester, N. H., manufacturers of brushes is represented in the South at present by T. R. Thirsk. The company has recently gotten out a very attractive set of blotters, capped with celluloid with an appropriate inscription.

H. A. METZ & CO., New York City, are sending out copies of their sample card No. 8, illustrating the extreme fastness of their Helindone colors to chlorine bleach. In addition to this, these colors are remarkably fast to light and all like injurious influences. The samples of Helindones shown in colors from yellow to brown, were treated for one hour in a solution of bleaching powder at 2 degrees Twaddell, which did not affect the color. Samples and instructions will be furnished by the company to any one who wishes to try them.

CASSELLA COLOR CO., New York City, has recently issued two sample cards showing new colors on cotton and silk goods. One card describes Immedial Green Blue C V, giving all of its properties, the directions for dyeing and samples of the dyed materials. This dye is especially well suited for producing shades of the greenish cast peculiar to light indigo dyeing. Diamine fast scarlet G G F, 4 B F S, B F F, 5 B F F, 7 B F F, are illustrated with dyed samples in the other card. The addition of these new brands to the company's line of Diamine fast scarlet offers a still wider range of shade toward a bluish cast, frequently called for, and completes the line in a most desirable manner. These diamine fast scarlets are characterized by their fastness properties. The cards will be sent to dyers upon request.

E. HOWARD CLOCK CO., Boston, Mass., was awarded the grand prize for watchman's clock at the Alaska-Yukon Exposition. This company has recently supplied watchman's clock systems for the Great Northern Hotel, New York City, and the Coney Island Hospital, also the Hebrew Infant Asylum, and the A. Schoenhut Co., Philadelphia, Globe-Wernicke Co., and King Machine Tool Co., both of Cincinnati, O. The Wood Worsted Mills, Lawrence, Mass., have recently ordered another watchman's clock system which is in addition to the one furnished them previously. The company has under construction a very extensive watchman system for the Nashawena Mills, New Bedford, Mass., which is understood to be the largest of its kind in the world. The firm of C. F. Hovey & Co., Boston, Mass., have just ordered a Howard watchman clock system.

H. E. ANSCHULTZ, CIVIL ENGINEER, MONTGOMERY, ALA., has just published his "Cotton Mill Map of Alabama and Georgia" which shows the counties, county seats, and only such cities, towns and villages to which cotton mills are adjacent in those two states. The map gives the location of every cotton mill in the two states, each mill being indicated by a solid square. These squares are numbered and by referring to the index and key number, the address, number of spindles, kind of power used, and consumption of cotton per year in bales can be ascertained. All railways are plainly marked. The map also shows the location of all water powers, both in operation or available. This work has been carefully compiled, accurately drawn, and it is, therefore, authentic. This map is especially valuable to the mill owner and operator, cotton broker, cotton buyer, mill and supply men and their representatives, and all dealers in cotton products and machinery. It may be obtained through this office upon receipt of the price, $1.00.

ALBERT RAU has established a branch office at 184 Summer St., Boston, Mass., for the sale of yarns, under the management of W. H. Angeny.

ARABOL MFG. CO., New York City. Bellicosa, the new softener made by the Arabol Mfg. Co., New York City, recommends itself to the progressive manufacturer by its good results and its easy handling. It is ready for use in a few minutes. There is no need to prepare more than what is required for any single batch of size. It is claimed to be more economical than softeners used hitherto. It is slightly alkaline and should not be used with acid blue.

THOMAS B. JEFFERY & CO., Kenosha, Wis., has found it necessary to largely increase its power equipment to meet the growing demand for Rambler automobiles. The new apparatus will consist of an Allis-Chalmers unit comprising a 24-inch and 48-inch x 42-inch heavy duty, cross-compound engine, direct connected to a 1,000 K. V. A., 480 volt, 60 cycle, 3 phase, 100 R. P. M., alternator. The engine will operate with 130 pounds steam pressure and 26-inch vacuum.

KERR TURBINE CO., Wellsville, N. Y., has just issued two new bulletins, No. 9 and No. 10, "Steam Turbine Generators, Steam Turbine Centrifugal Pumps, and "Turbo-Blower Units." The latter bulletin illustrates practical outfits for forced and induced drafts, gas works service and for furnishing blast for cupolas. The other bulletin includes generating sets for electric power and lighting, and pumping units for boiler feeding, fire service, water supply, circulating condenser water, draining pumps, and for other service where water must be delivered at moderate or high pressure or against considerable head.

Both of these bulletins contain interesting descriptive matter about the construction and operation of Kerr Steam Turbines. The comparisons between turbine and recipro-

cating engines can profitably be read by all who are in charge of or operate steam power plants. Both bulletins will be mailed upon request to the home office.

The American No-Slip Cement Co., Boston, Mass., reports that about 300 manufacturers are now users of Palium, and duplicate orders have been received from over 25 per cent. of these users within a short time. Palium has been applied to loom pulleys with the result that the output of the looms has been increased from three to seven per cent. It is claimed that the looms also run more evenly. It would be to the advantage of every textile concern to investigate this product.

L. D. Armstrong of the Atherton Pin Grid Bar Co., Providence, R. I., reports a recent order for the full equipment of the mills of the Fall River Iron Works Co., with their Positive Split Lap Preventer and Dirt Eradicator. This order, with other recent orders, covering the full number of machines from the Louisville Cotton Mills and Meridian Yarn Mills for both Split Lap Preventers and Pin Grid Bars, starts their new shop at 57 Weybossett Street, Providence, R. I., in good shape.

The Technical Publicity Association held a largely attended meeting on Thursday evening, February 10th, in the galleries of the National Arts Club, 14 Gramercy Park, New York. It was in the nature of an experience meeting on the subject of "Catalogs." An interesting and prolonged discussion, participated in by many of the advertising managers representing some of the most prominent of the technical manufacturing concerns, and by representatives of publishing and paper firms, made the session a profitable one.

Considerable sentiment in favor of adopting standard sizes for commercial literature of this sort was found at the meeting. Many complained of the unevenness and lack of system among numerous catalogs, making them difficult to file. Among those participating in the discussion were Martin P. Rice, head of the publicity bureau, General Electric Co., Schenectady, N. Y., J. George Frederick, editor "Printers Ink," Leroy Fairman, editor "Advertising & Selling," A. P. Waterman, Adv. Mgr. Holtzer-Cabot Electric Co., C. R. Lippman, Adv. Mgr. Genuine Bangor State Co., and Hal Marchbanks of the Hill Print Shop.

The World's Record for rapid sales of automobiles to individual buyers was established at the Ninth Annual Chicago Show when Thomas B. Jeffery & Co., makers of the Rambler, sold one hundred and seventy-five separate cars in seven days, making a total of $350,000 worth of automobiles. Charles T. Jeffery, head of the Rambler company, under whose direction this enormous sales record was made, says that the greatest sales of cars during the next five years will be made over that area stretching between the copper country and the southern rim of the Texas Panhandle. Hundreds of farmers, stockmen and fruit growers bought cars at this show. The demand was not for the low priced car, as many had anticipated, but the buyers seemed to desire power, comfort and quality more than cheapness. The average price of the cars attaining the largest sales was $2,000. Last year the Rambler broke all previous show sales records when 160 of these cars were sold at an average price of $1,900 each.

The Woonsocket Machine & Press Co., Woonsocket, R. I., manufacturers of cotton roving machinery, announce that they will be represented in the South after March ing, Charlotte, N. C. Mr. Mayes is widely and favorably known throughout the Southern textile field.

L. C. Chase & Co., Boston, Mass., manufacturers of duck horse blankets, have removed their factory from Cambridge, Mass., to Newton, Mass. The plant will be under the management of Mr. MacDonald, and additional equipment will be installed to take care of the growing business.

MILL NEWS.

Notices of mill projects, additions or improvements are solicited for this department.

Alabama.

HUNTSVILLE. Lowe Cotton Mill has begun work on its extension, which will cost $50,000. 200 looms will be installed, and the plaint when complete will be euipped with 500 looms and 27,000 spindles.

Arkansas.

FORT SMITH. Reports state that plans are being made to secure a $250,000 cotton mill for this place, to be equipped with 10,000 spindles.

TEXARKANA. Dr. H. L. O'Shears, one of the large cotton growers of this section, is interested in a movement for the organization of a company to build a cotton mill at this place. The plans of the promoter are to distribute the stock in the immediate vicinity of Texarkana.

California.

SAN DIEGO. A silk mill will be erected at this place at a cost of $43,000.

Connecticut.

DANIELSON. Danielsonville Cotton Co. has installed four looms to be used in the manufacture of blankets. It is expected that additional looms will be installed for this purpose at a later date.

MANCHESTER. The Glastonbury Knitting Co., manufacturers of light and medium knit goods, will double its capacity at Manchester Green by the addition of a two-story building, 50x150 ft.

SOUTH MANCHESTER. Cheney Bros. have started manufacturing in the Bigelow mill, which they recently purchased. The present equipment consists of 64 looms, but this number will be increased to 100 within a short time.

THOMPSONVILLE. The Hartford Carpet Corporation will immediately begin the construction of an additional factory. 3,000 operatives are employed.

WILLIMANTIC. Windham Mfg. Co. will enlarge its plant in the spring by connecting the No. 1 and the No. 2 mills with a four-story building 35x70 ft. J. H. Hambly, Pres., Walter J. Nutting, Sec. and Mgr.

WINSTED. Winsted Hosiery Co. has awarded contract for the erection of an additional building to be 20x90 ft., four stories high, of brick construction.

Florida.

TALLAHASSEE. R. Griffin Johnson is reported to be planning the organization of a company for the erection of a cotton mill in this city. It is understood that the enterprise is being pushed chiefly by Northern capitalists. Reports state that $50.000 have been offered for investment provided the Tallahassee people invest a similar amount.

Georgia.

ATLANTA. National Duck Mills have had an involuntary petition in bankruptcy filed by J. L. Riley Co., O. M. Sutton and the Georgia Railway & Electric Co. This company was organized in 1907 with a capital stock of $15,000, to operate the plant of the Southern Rug & Carpet Mills.

CORNELIA. F. B. Sears, of Boston, Mass., is interested in a plan to establish a $500,000 cotton mill at this place. The people of Cornelia are to raise $100,000, the remaining $400,000 to be furnished by the promoters.

DALLAS. Euharle Hosiery Mill has been incorporated by W. A. Foster and W. E. Spinks with a capital stock of $10,000.

DOUGLASVILLE. The Douglasville Knitting Mill has made

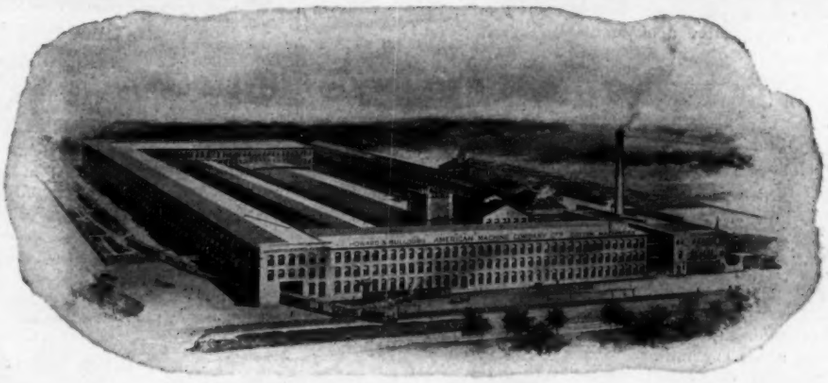
C. E. RILEY, Treas.
Boston Office
65 Franklin St.

HOWARD & BULLOUGH
American Machine Company, Ltd.
PAWTUCKET, R. I.

Southern Offices
814-816 Empire Bldg.,
Atlanta, Ga.

COTTON MACHINERY

ARE YOU INTERESTED TO KNOW WHAT IS THE BEST?



SEND FOR OUR DESCRIPTIVE CIRCULARS WITH LISTS OF USERS.

HOPPER BALE OPENERS
FEEDERS
SELF FEEDING OPENERS
BREAKER INTERMEDIATE
and FINISHER LAPPERS

REVOLVING FLAT CARDS
DRAWING FRAMES
SLUBBING FRAMES
INTERMEDIATE and
ROVING FRAMES

IMPROVED SPINNING FRAMES
TWISTERS
CONE WINDERS
WARPERS and SLASHERS

WE INVITE YOUR INVESTIGATION AND COMPARISON.

contracts and will remodel its building and install steam power equipment for 25 horse-power. Acme Knitting Mill & Needle Co., Franklin, N. H., is to supply the knitters; Jno. W. Hepworth & Co., loopers; Wildman Mfg. Co., Norristown, Pa., ribbers. The company is capitalized at $15,000.

GRIFFIN. Griffin Mfg. Company is now headed by J. P. Nichols, with Wilbur Barnes, Sec. and Treas., the former president, W. J. Kincaid, having sold his stock in the company, amounting to $200,000, at par to S. Grantland, H. W. Barnes, J. P. Nichols and B. R. Blakely. J. M. Brawner, former Sec. and Treas., sold his stock, amounting to $37,000, at par to J. P. Nichols, Douglas Boyd and J. J. Mangham. The company was organized in 1884 with a capital stock of $84,000 by W. J. Kincaid. The present capital is $600,000.

HARTWELL. Beaver Dam Mfg. Co. has been incorporated with a capital stock of $125,000. Bailey Fowler, Pres.; Elbert Fowler, Vice-Pres.; and Jno. M. Wright, Sec. This company acquired the Witham Cotton Mills containing 6,000 spindles and 185 looms.

MONTICELLO. M. R. Sears and J. L. Benton and others of this city will form a $300,000 company to build a cotton mill.

SENOIA. Senoia Duck Mills have awarded contract for their building to J. W. Minter, Atlanta, Ga. The building will be 94x267 ft. Capital stock of the company is $100,000.

Massachusetts.

ADAMS. The Berkshire Cotton Mfg. Co. has ordered twelve new Nasmith combers.

AMESBURY. Hamilton Woolen Co. Mills Nos. 4, 5, and 7 are now driven by electricity, the power for which is furnished by the new electric station which has been constructed recently.

CLINTON. The Lancaster Mills will erect an additional building 150x400 ft., four stories high.

LOWELL. Massachusetts Cotton Mills have increased their capital stock from $1,800,000 to $3,000,000. The company will erect a large mill at this place at an early date.

NEW BEDFORD. Gilman Mill has awarded contract for the addition to the mill to the J. J. Prindiville Co., South Framingham, Mass. Preliminary work for the new construction was begun about the middle of February.

NEW BEDFORD. Thos. F. Glennon will according to reports, erect a cotton mill in this city.

SPRINGFIELD. The Springfield Cotton Fabrics Co. has filed papers of incorporation with a capital stock of $10,000. The company will manufacture cotton and canvas goods. The officers are: Wm. Sanford, Pres.; Richard C. Wagoner, Treas.; E. Frank Whitman, Sec.

UXBRIDGE. Millbury Mills will, according to reports, lease the Rivulet Mills property of the Richards-Sayles Co. for a period of six months with the privilege of an additional six months.

Michigan.

BAY CITY. World's Star Knitting Co. has increased its capital stock to $250,000 for the purpose of doubling its capacity by erecting a five-story building 50x190 ft. A one-story office building will be constructed 20x80 ft. and 125 H.P. engine and new generator will be installed in the new mill. The machinery in the entire plant will be driven by individual motors, while a ventilating system regulated by electricity will change the air every twenty minutes.

DETROIT. The Cardswell Hosiery Co. has been incorporated with a capital stock of $25,000. The company operates a mill at Detroit, manufacturing lumbermen's socks.

New Hampshire.

LACONIA. Wm. Clow & Sons are erecting an addition to the finishing department of their plant. The mill was incorporated in 1907 with a capital stock of $50,000, to manufacture full, regular and seamless hosiery and lumbermen's socks. H. B. Clow is president, and Alonzo L. Clow, Sec. and Treas.

New Jersey.

BEVERLY. Beverly Underwear Co. is adding an additional story to its warehouse. The addition is being built by Jos. Hammil of that city.

PATERSON. Baker Silk Co. has been incorporated with a capital stock of $10,000.

PATERSON. The Eagle Silk Mfg. Co. has been incorporated with a capital stock of $10,000, by Morris Wilberman, Jos. Bogan and Norris Neufeld.

PATERSON. Hall-Claus-Terhune Co. is the new name of the former Brunswick Carpet Mills Co.

New York.

FULTON. Parkhurst Knitting Mills have been incorporated with a capital stock of $120,000 by W. H. and K. J. Stanwick and D. E. Holly of that city.

MELLENVILLE. Wellington Cotton Mills, which have been closed for some time, have been sold to G. W. Landau, a silk manufacturer of Paterson, N. J.

NEW HARTFORD. The New Hartford oCtton Mfg. Co. has increased its capital stock from $150,000 to $200,000.

YONKERS. Alexander Smith & Sons Carpet Co. wil begin work on a large brick building at an early date.

North Carolina.

BURLINGTON. Keystone Finishing Mills is the name of a plant organized by John H. Tate, High Point, N. C. This company will dye, finish and sell hosiery.

BURLINGTON. Whitehead Hosiery Mills will double their capacity when the additional building, now under construction, is completed. Orders for additional machinery have been placed.

CHARLOTTE. Armon Mfg. Co., with C. E. Hutchinson, Pres. and Treas., has taken over the Mountain Island Cotton Mill, containing 10,000 spindles, and located a short distance from Mount Holly.

CONCORD. Young-Hartsell Mills Co., according to reports, install machinery to weave the product of its present equipment of 10,050 ring spindles.

DURHAM. Durham Hosiery Mill Co. No. 4 has been incorporated with a capital stock of $140,000 by Julian S. Carr, W. S. Carr and others.

DURHAM. Jno. Merrick and R. B. Fitzgerald, negroes, will, accoring to reports, build a hosiery mill at this place with negro labor and negro capital. It is proposed to operate the mills entirely with negro help. The capital stock of this company is $50,000. The mill will begin manufacturing with ten machines.

ELIZABETH CITY. It is reported that an option has been obtained from M. N. Sawyer of this city on a tract of land for the purpose of building a hosiery mill.

GASTONIA. Flint Mfg. Co. has increased its capital stock from $150,000 to $200,000. The present equipment is 12,500 ring spindles.

HIGH POINT. W. B. and F. M. Pickett, J. W. Harris, J. L. Woodcocks, and others, plan the organization of a company with a capital stock of $150,000 to build a cotton mill.

LAURINBURG. Report states that J. P. McRae is interested in the organization of a company to build a new weaving mill.

LEXINGTON. Wennonah and the Nokomis Mills are now being run with electric power from the Southern Power Co.'s lines.

MORGANTON. Reports state that manufacturers interested in the yarn mills at this place have started a movement for the organization of a new company which will establish a weaving mill to handle the products of the present spinning plants.

NEWELL. Reports state that a $300,000 cotton mill for the manufacture of fine goods will be erected in this place by the Dukes of North Carolina. The mill will probably be run by electricity furnished by the Southern Power Co.

NEWTON. Newton Hosiery Mill, owned by D. J. Carpenter, has closed down owing to financial embarrassment. The mill will probably be taken over by parties who will continue the business in Newton.

ROBERSONVILLE. Robersonville Hosiery Mfg. Co. has been incorporated with J. H., A. S. and J. C. Roberson and others with a capital stock of $100,000.

ROCKINGHAM. Entwistle Mfg. Co. is progressing with the construction of its plant, which is to consist of a main building 128x480 ft., three stories high. The mill will be equipped with 40,000 spindles and 1,000 looms for manufacturing print cloth. Wm. Entwistle, Pres.; capital stock of company $500,000.

ROCKINGHAM. Hannah Pickett Mills will build an additional weave shed 100x250 ft., to be equipped with 400 looms. It is estimated that the new building and equipment will cost about $100,000. Contract will be let at an early date.

ROCKINGHAM. Ledbetter Mfg. Co. plans the erection of an additional building for the installation of looms, and will also enlarge its water power dam 15 ft. to 27 ft. high. The present equipment of the company is 2,700 spindles.

ROCKY MOUNT. Rocky Mount Hosiery Co.'s plant has been closed for some time to install a 100 H.P. engine and considerable new machinery in the new 36x72 ft. addition recently built. The capacity of the plant is now 2,000 doz. children's ribbed hose per day. Geo. T. Andrews is Gen. Mgr.

SPRING HOPE. G. W. Joyner and associates are planning the organization of a $50,000 company to establish a cotton mill.

THOMASVILLE. Amazon Cotton Mill has begun the erection of its buildings to be equipped with 7,000 spindles for manufacturing yarns. Contracts have been awarded for machinery, etc. J. W. Cannon, Concord, N. C., is Pres.

WINSTON-SALEM. T. H. Hanes Knitting Co. will increase its capital stock from $100,000 to $350,000 to build a yarn mill equipped with 10,000 spindles for manufacturing hosiery yarns for the company's knitting plant.

WINSTON-SALEM. Inverness Mill Co. have elected the following officers: H. G. Chatham, Pres.; John L. Gilmer, Vice-Pres.; Lawrence McRae, Sec'y-Treas. The mill will be equipped with 10,000 spindles and 300 looms, driven by electric power. Mr. McRae is in charge, and plans and specifications are being prepared.

Ohio.

PIQUA. Stuart-Hance Underwear Co. is the new name of the former Stuart-Brown Underwear Co. The capital stock has been increased from $25,000 to $75,000.

Oklahoma.

LAWTON. E. L. Shuford Mfg. Co., recently incporated with a capital stock of $500,000 to build a mill for 10,000 spindles and 340 looms, will have a main building two stories high, 79x406 ft., a 40x53 ft. engine room, and a 40x42 ft. boiler room. Plans for the warehouse, office building, cloth room, etc., are being drawn. E. L. Shuford, Hickory, N. C., is Pres. and J. E. Sirrine, Greenville, S. C., engineer in charge.

Oregon.

PORTLAND. The Portland Knitting Co. has been incorporated by C. C. Jantzen for the purpose of manufacturing all kinds of knit goods.

Pennsylvania.

CHESTER. S. Courtauld & Co. have awarded a contract for the mill building to W. J. Provost, of this city. Material is arriving daily and the work will be rapidly pushed to completion.

CHESTER. Lincoln Mfg. Co., which was recently purchased by Jos. Parvin, Philadelphia, Pa., is adding 16 combers to its equipment. The mill has been in operation since January under the management of J. T. Thatcher.

READING. Pennsylvania Underwear Co. has purchased a mill building in this city which will be remodelled for manufacturing underwear.

Rhode Island.

ESMOND. The Esmond Mill, manufacturing napped fabrics, has increased its capital stock by $750,000, issuing $100,000 common and $650,000 preferred.

HARRISVILLE. Wm. Tinkham Co. will build a woolen mill, three stories high, 48x270 ft. A small building 60x175 ft. will be used for the power house, dye house, and dry house. The cost of the new plant is estimated at $75,000.

WOONSOCKET. Nyanza Mills have been incorporated and organized with the following officers: Jno. W. Farwell of Cohasset, Mass., Pres.; and Nathaniel S. Ayer, Boston, Mass., Treas. Plans are being prepared for the erection of two buildings, to be equipped with 25,000 spindles.

South Carolina.

ANDERSON. Brogon Mills will install additional machinery in the near future. The extent of the addition has not been announced.

EASLEY. Easley Mills, through their president, J. M. Geer, have made contract with the Southern Power Co. for 250 electric horse-power to supplement the power now used to run the mill and also to light the mill village.

GREENWOOD. The Panola Cotton Mills have been incorporated with a capital stock of $300,000, by S. S. Evans, Geo. H. Taylor, Ben T. McKeller, S. H. McGhee, and others. The equipment will consist of 10,000 spindles and 300 looms for manufacturing print cloth. Steam power will be used. Lockwood, Greene & Co., Boston, Mass., are the engineers in charge .

McCOLL. T. R. Gibson will, according to reports, build a cotton mill in this place.

WALHALLA. Oconee Knitting Mill has filed a notice of dissolution. This company was organized in 1904 with a capital stock of $50,000, to manufacture misses' cotton lisle seamless hosiery. R. T. Jaynes is Pres.

WELLFORD. Wellford Mfg. Co., recently incorporated with a capital stock of $40,000 by W. M. Jones of Spartanburg, S. C. will, according to reports, buy the Jordan Mfg. Co.'s weaving mill at Wellford, and will add spindles.

Texas.

EL PASO. Josephus Boggs is interested in the organization of a million dollar company for the erection of a cotton mill. It is reported that local capital to the extent of $250,000 can be secured, and that they will be given a free site.

HOUSTON. W. H. Gill, chairman of the Penitentiary Board will, according to reports, have plans drawn for a cotton mill for which the Texas Legislature appropriated $100,000 some time ago.

McKINNEY. Lone Star Cotton Mills has begun work on the foundation for the mill building. The company is capitalized at $200,000 and will have an equipment of 10,000 spindles and 300 looms for the production of denims. It is planned to have the plant in operation by August 1, 1910. John Hill, Atlanta, Ga., is the engineer in charge.

Wisconsin.

APPLETON. Saxony Knitting Co. has been incorporated with a capital stock of $15,000 by M. L. Zwicker, Otto Schultz and E. W. Zwicker.